Operating Manual

PacDrive™
Controller P600

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ELAU PACKAGING SOLUTIONS

Schneider Electric

Corporate information

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1 About this Manual

1.1 Introduction

Read this manual before you use ELAU Components for the first time. Take particular note of the safety instructions (see 2 General Safety Instructions). As described in section 2.4, only those persons who meet the Selection and qualification of employees (see 2.4 Selection and Qualification of Employees) are allowed to work on this unit.

A copy of this manual must always be available for personnel who are entrusted to work on ELAU components.

This manual is intended to help you use ELAU Components and its intended applications safely and properly.
You must observe the contents of this manual. Doing so helps avoid hazards, minimize repair costs and downtime, extend service life and increase reliability.

You must also observe the rules and regulations on accident prevention and environmental protection that apply in the country where the product is used and at the installation location.

1.2 Symbols, Characters, and Notation

The following symbols and characters are used in this document:

Representation	Meaning
▪	First level bullet point
-	Second level bullet point.
▸	**Activity symbol:** The text after this symbol contains an instruction. Follow the instructions in order from top to bottom.
✓	**Result symbol:** The text after this symbol contains the result of an action.
Keyword	If the descriptive text contains technical terms (such as parameters), they are highlighted in bold.
`lBufSelect:AXIS_BUF_SELECTION;` `(* Buffer Auswahl *)`	Program code is written in a different font.
	Information symbol: After this symbol, you will find instructions and useful tips on using the components.
	Warning symbol: Safety instructions are provided at relevant points. They are featured with the preceding symbol.
	This symbol is followed by information about the content of the section and serves as an orientation aid.

2 General Safety Instructions

This section contains general requirements for safe work. Each person who uses ELAU Componentsor works on ELAU Componentsmust read and follow these general safety notes.
If activities involve residual risks, a specific note is made at the appropriate points. The note details the potential danger and describes preventative measures to avoid it.

2.1 Principle

The ELAU Components are state-of-the-art and conform to recognized technical safety regulations. However, using this product could result in risk of life and limb and of damage to property if:

- The ELAU Componentsis not used properly
- Work on the ELAU Componentsis carried out by unqualified or untrained staff
- You change or modify the ELAU Componentsinappropriately
- You fail to test the protective measures implemented after installation, start-up, or maintenance
- You do not observe the safety notes and safety regulations

Operate the ELAU Components only when it is in flawless technical condition. Observe regulations, act in a safety-conscious and danger-conscious manner, and observe the information and instructions in this manual.
For the ELAU Components to run perfectly and safely, it must be transported, stored, installed, and assembled correctly and maintained carefully.
If circumstances occur which reduce safety or cause changes in the operating performance of the ELAU Components, switch it off immediately and contact the responsible service staff.
In addition to this description, you must also observe the following:

- The regulative, warning, and instruction signs as well as the warning instructions on the ELAU Components, the connected components, and all signs in the switching cabinet
- The operating instructions of the other components
- The generally applicable local and national safety and accident prevention regulations
- Applicable laws and regulations

2.2 Notation for Safety Instructions

Risk categories

The safety notes in this manual are divided into various categories. The table below shows which risks and possible consequences the symbol (pictogram) and the signal words refer to.

Pictogram	Signal word	Definition
	DANGER	Indicates a situation involving direct danger, which will result in death or grave bodily harm if the safety regulations are not followed.
	WARNING	Indicates a possible situation, which can result in grave bodily harm or major damage to property if the safety regulations are not followed.
	CAUTION	Indicates a potentially dangerous situation that could result in property damage if the safety regulations are not followed.

2.3 Proper Use

The ELAU Components are intended to be installed in a machine or assembled with other components to form a machine or system. You may only use them in accordance with the installation and operating conditions described in the documentation. You must use the accessories and add-ons (components, cables, lines, connectors, etc.) specified in the documentation. You must not use any third-party devices or components that are not expressly approved by ELAU.
For proper use, you must also:

- observe the operating manuals and other documentation (see appendix) and
- comply with the inspection and maintenance instructions.

Operating conditions at the installation location must be checked and maintained in accordance with the required technical specifications (performance data and ambient conditions). Start-up is prohibited until it is guaranteed that the usable machine or system in which the motor is installed meets all requirements of EC Directive 98/37/EC (machinery directive).
In addition, the following standards, directives and regulations are to be observed:

- DIN EN 60204 Safety of machinery: Electrical equipment of machines
- DIN EN 292 Part 1 and Part 2 Safety of machinery: General terms, general rules for design
- DIN EN 50178 Electronic equipment for use in power installations
- EMC Directive 89/336/EEC

2.4 Selection and Qualification of Employees

This description is aimed solely at technically qualified personnel who have detailed knowledge in the area of automation technology. Only qualified personnel can recognize the significance of the safety instructions and put them into practice correctly.

The description is intended primarily for designers and implementation engineers from the fields of mechanical and electrical engineering, plus service engineers and start-up engineers.

Work on electrical equipment

Work on electrical equipment may only be carried out by qualified electricians or by trained staff under the instruction and supervision of a qualified electrician in accordance with electrical regulations.
Qualified electricians are only those persons who can perform the following tasks as a result of their training, knowledge, and experience:

- Evaluate the task assigned to them,
- Identify possible dangers, and
- Take appropriate safety measures.

2.5 Residual risks

Health risks arising fromELAU Components have been reduced by means of safety technology and design engineering. However a residual risk does remain, since ELAU Components work with electrical voltage and electrical currents.

Installation and Handling

⚠ WARNING

Risk of injury risk during handling!
Risk of bodily harm from crushing, shearing, cutting, and hitting!

- Observe the general construction and safety regulations for handling and installation.
- Use suitable installation and transport equipment correctly and use special tools if necessary.
- Prevent clamping and crushing by taking appropriate precautions.
- Wear suitable protective clothing (for example, safety goggles, safety boots, protective gloves).
- Do not stand under suspended loads.

Touching electrical parts

Touching parts with a voltage greater than 50 volts can be hazardous. When electrical units are in operation, certain parts are inevitably charged with a dangerous voltage.

⚠ DANGER

High voltage!
Risk of fatal injury!

- Observe the general construction and safety regulations for working on high-current electrical systems.
- After installation, check the fixed connection of the ground conductor to all electrical units to ensure that connection complies with the connection diagram.
- Generally, and also for brief measurements and inspections, operation is only allowed using a fixed connection from the ground conductor to all electrical components.
- Disconnect the unit from the power supply before working on electrical parts with a voltage greater than 50 volts. Prevent the unit from being switched back on. Wait at least 5 minutes after shutting down before accessing the components. Check the voltage with a voltage meter before accessing the unit to be sure that the voltage is less than 50 volts.
- Do not touch the electrical connection points of the components when the unit is switched on.
- Before switching on the unit, safely cover the live components to prevent contact.
- The following provides protection against indirect contact (DIN EN 50178, Section 5.3.2).

Dangerous Movements

There are various causes of dangerous movements.

- Wiring or cabling faults
- Error in the application program
- Component fault or flaw
- Error in the measured value and signal transmitter
- Operation error

Personal protection must be ensured by a higher-level monitoring functions or measures in the plant. You should not rely only on the internal monitoring system of the drive components. Monitoring systems or measures must be applied according to the specific conditions and circumstances of the system in accordance with a hazard and error analysis of the machine manufacturer. The applicable safety instructions for the system must be incorporated in such measures.

⚠ DANGER

Dangerous Movements!
Risk of fatal injury, serious bodily harm and/or damage to property!

- Prevent entry to a danger zone, for example with protective fencing, mesh guards, protective coverings, or light barriers.
- Correctly size protective equipment.
- Position EMERGENCY OFF switches so that they are easily assessable and can be quickly reached. The functionality of EMERGENCY OFF equipment should be checked before start-up and during maintenance periods.
- Prevent unintentional start-ups by disconnecting the power connection of the drive using the EMERGENCY OFF circuit or using a secure start-up lock out.
- Bring the drives to a complete standstill before accessing or entering the danger zone.
- While working on the system, de-energize the electrical equipment using the main switch and prevent it from being switched back on.
- Avoid operating high-frequency, remote control, and radio devices close to the unit and system electronics and their feed lines. If such usage is unavoidable, you must check the system for possible malfunctions in all positions of normal use before initial start-up. Where applicable, it is necessary to carry out a special EMC check of the system.

"Protective extra-low voltage"

PELV Protective Extra-Low Voltage

The signal voltage and control voltage of the PacDrive™ devices are <33 Volts. In this range and in accordance with IEC 60364-4-41, the specification as PELV system contains a protective measure to guard against direct and indirect contact with dangerous voltage through **"safe separation"** of the primary and secondary side in the system/machine. ELAU strongly recommends that the system/machine be run with safe electrical separation.

⚠ DANGER

High voltage due to incorrect connection!
Risk of death or serious injury!

- Please ensure that only devices, electrical components or lines that have sufficient, safe electrical separation from the connected circuits in accordance with the standards (EN 50178 / 1998 edition - Electronic equipment for use in power stations) are connected to the signal voltage connectors of this component.
- Ensure that the existing electrical separation is maintained throughout the entire circuit.

FELV Functional Extra-Low Voltage

When using ELAU components in systems that do not have safe separation as a protective measure against direct or indirect contact of dangerous voltages, all connections and contacts (e.g. PacDrive controller, Sub-D connector, serial interface) that do not meet protection class IP2X require a permanent cover. The cover or the device connection of the connected device must be designed so that it can only be removed using a tool. The protective measure must be adhered to for all connected devices.

3 System Overview

3.1 Drive Concepts of Packaging Machines

Modern machine design in the packaging industry is characterized by the demand for high dynamics, flexibility, modularity and profitability. Packaging machines were traditionally equipped with a main drive and an upright shaft that coupled all other moving organs in the machine with complex motion functions usually via mechanical components. With such packaging machines, it is extremely difficult to design the machine flexibly for various products. Even minor changes in the packaging process, especially during product changeover, are associated with considerable conversion efforts and machine breakdown.
Packaging machines with an electronic shaft, on the other hand, enable complete flexibility. Electronic servo drive systems are used instead of curves and linkage and a virtual electronic shaft ensures that the individual motion axes are synchronized. Desired synchronous movements and movements with angular synchronism are specified by a central controller.
Unplanned machine conditions such as stop or emergency stop situations and initialization motions can be realized with angular synchronism. Dynamic changes of the packaged goods or packaging in the system, such as slippage of the products to be packaged or a stretching of the packaging material, can be recorded by sensors while the machine is running and eliminated by adapting the corresponding motion processes. The classical mechanical machine design has been permanently changed and significantly simplified by this development. The structure of the packaging machine can be broken down into clear and standardizable modules.

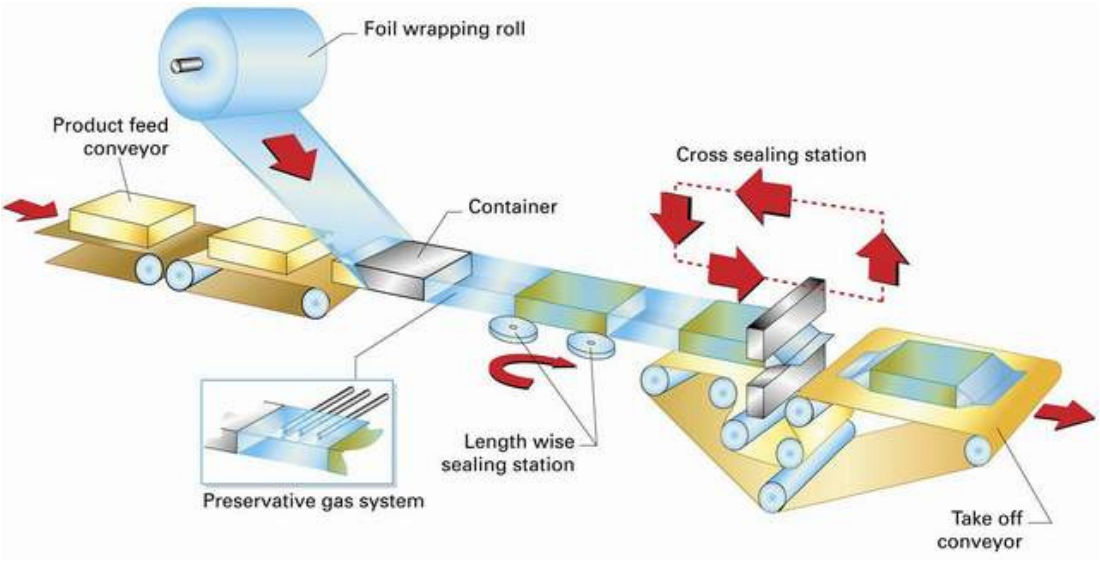


Figure 3-1: Diagram of a packaging machine

3.2 Structure of the PacDrive™ Automation System

The The PacDrive™ automation system provides the optimal solution for electronic packaging machines, both in terms of technology and economy. PacDrive™ consists of a high performance controller run on a PC or controller-based architecture, the PacDrive controller and the digital servo amplifiers which contain the power supply unit, the final stages and the servo controller for the individual axes.
The PacDrive controller is the intelligent head of the system and is based on an industrial PC. The PacDrive controller synchronizes and coordinates the motion functions of the packaging machine. Thanks to the use of an IEC 1131-3 soft PLC, areas of application that had previously been unavailable to a classical PLC have been opened up to the PacDrive controller family. The individual PLCs or motion tasks can thus be split up into various parallel tasks that can then be implemented with the programming environment EPAS-4 as per the IEC 61131-3 standard. Up to 99 servo axes can be connected to one PacDrive controller and supplied with motion data.
The circular, digital real-time bus SERCOS implements the secure data exchange with the MC-4 servo amplifiers. With the use of fiber optic technology, the data bus is insensitive to electromagnetic disturbances and cyclically supplies the decentralized MC-4 servo amplifiers with new set points at a data rate of up to 16 MBaud. All internal conditions of the axes can be called up via the real-time bus and processed by the PacDrive controller.
In addition to digital and analog inputs and outputs, each PacDrive controller has two serial interfaces and one Ethernet interface available. Thanks to the integrated OPC interface, it is possible to connect various process visualization and control systems to PacDrive™. Additional peripheral components can also be connected using the field bus interface module. A PacDrive controller can be the field bus master or the slave. The international field bus standards CANopen, PROFIBUS-DP and DeviceNet are supported. The built-in interfaces enable remote diagnosis via telephone modem or Internet. PCs can communicate via TCP/IP with the PacDrive controller and directly diagnose the conditions of the controller.

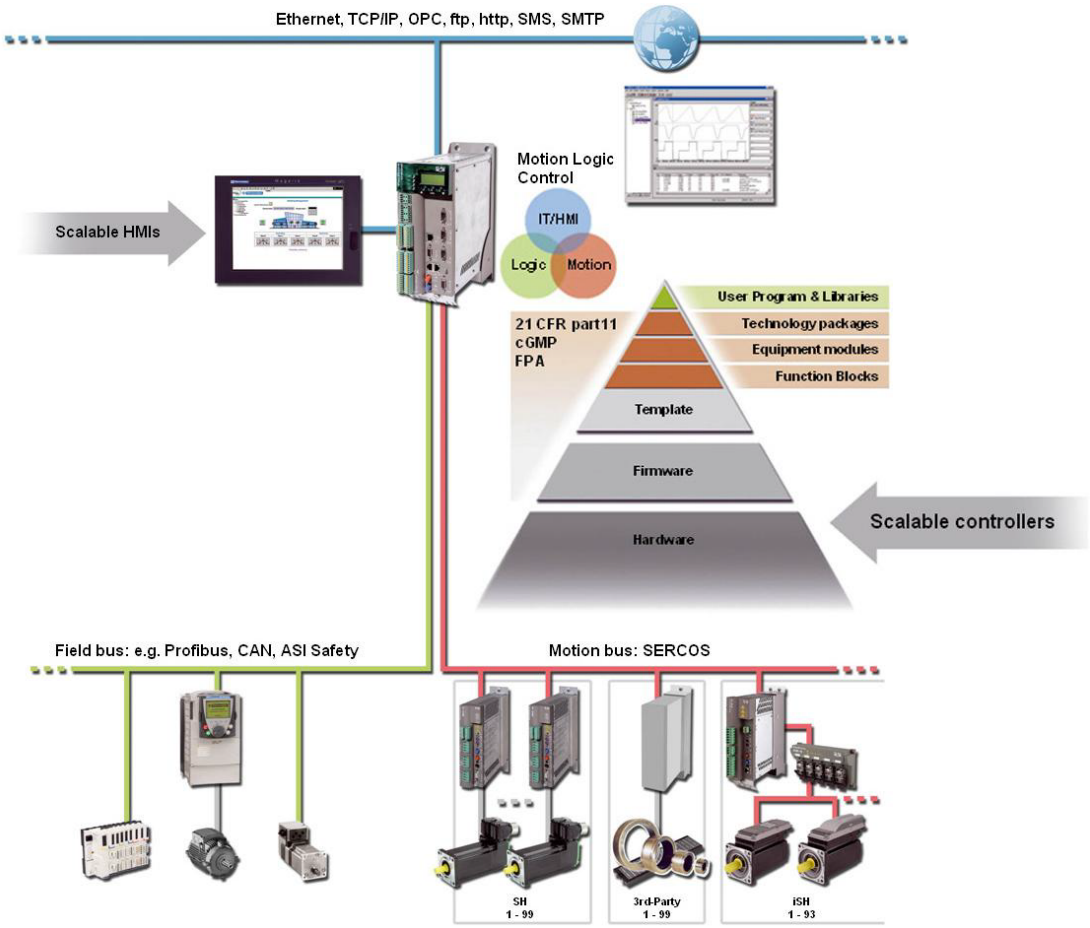


Figure 3-2: System overview of the PacDrive™ automation system

Alternatively, the PacDrive controller can be coupled with a conventional PLC (higher level than the PacDrive controller) via a field bus.

3.3 Components

Today's requirements mean that machinery concepts of a purely mechanical nature quickly reach their limits, because modern packaging is always requiring less material and is becoming more flexible and smaller. The required flexible linking of the function and motion sequences can only be ensured via intelligent software in the future.

PacDrive Engineering tools

- Automation Toolkit EPAS-4 for Configuration and Programming
- Motion Toolkit ECAM-4 for curve design and for the drive layout
- Engineering Interface ENI-4
- PacDrive Project Converter for quick and uncomplicated conversion of projects for various types of PacDrive controllers
- PacDrive Diagnostics for easy determination of service data
- PacDrive PacDisk-4 for creating flash disks for PacDrive controllers
- PacDrive Netmanage for locating, configuring and managing the PacDrive controllers
- PacDrive Firmware Assistant for easy firmware swapping of a PacDrive controller

- PacDrive SERCOS Firmware Assistant for easy firmware swapping of the SERCOS slave devices (MC-4, SCL, PS-4)
- PacDrive Change Detection Tool for detecting project changes

Automation Toolkit EPAS-4

Due to the combination of comprehensive functions and fully developed tools, the Automation Toolkit EPAS-4 is a good example of a powerful programming tool that is as easy to use as a standard office program.
The primary advantage of the EPAS-4 is that all components are well matched to each other. Benefits for the user: Quick familiarization and simple to operate.

- A tool for design and service
- Six standard IEC languages
- Simple programming using powerful libraries
- EPAS-4 based on CoDeSys from 3S
- Change detection for FDA conformity
- Engineering Interface (ENI) for multi-user processing

Motion Toolkit ECAM-4

The bridge between the mechanical package and the ECAM-4 software is unique on the market for its design and functionality . Complex mechanical motion sequences can be conveniently designed using the powerful tool and servo drives can be quickly and safely laid out in the sizing calculator using many practical aids, which is a boon for the mechanical engineer.
ELAU users are excited about the multi-axis motion ECAM-4 design toolkit. All of the VDI 2143 profiles and polynomials of the 5th order can be integrated in any number of motion segments. This preserves the mechanical package and allows swash-free transport.

The ECAM-4 engineering toolkit was specially designed for motion control applications in electronic packaging machines. With ECAM-4, you can now easily edit even the most complex motion profiles using the motion designer and you can quickly and safely lay out servo drives using the sizing calculator. Exhaustive online help is available to support you when you are working with ECAM-4.

The PacDrive controller family

comprehensive functionality

The PacDrive controller, microprocessor-based control hardware with the VxWorks real-time operating system, centrally implements the PLC and motion functions.
One PacDrive controller synchronizes, coordinates and generates the motion functions for a maximum of

- 8 drives for the PacDrive controller MAx-4 / 8
- 8 drives for the PacDrive controller C200
- 16 drives for the PacDrive controller C400
- 99 drives for the PacDrive controller MAx-4 / 99
- 99 drives for the PacDrive controller C600
- 22 drives for the PacDrive controller P600

of a food and packaging machine.
The most diverse standard HMIs are used for the HMI tasks. Whether it is low cost plain text or IPC, it is no problem for the flexible PacDrive controllers.
The PacDrive controller P600 is also equipped with a full-fledged PC. Due to its PC-based architecture, it can perform HMI tasks with no problem in addition to the usual motion functions.

PacDrive MC-4 servo amplifier

State-of-the-art technology

The MC-4 digital servo amplifier features compact, closed, wall-mountable construction as well as state-of-the-art technology. The innovative MC-4 has a power supply unit, power amplifier, and a software servo controller for one axis all installed in a single space-saving housing. Since it communicates with the PacDrive controller exclusively via fiber optics, it is also suitable for decentralized structures. It does not require a user program, processes single or multi-turn encoders, and configures itself using the electronic type plate in the SH motor.

Highlights of the PacDrive MC-4

- Broad voltage range
- Integrated power supply unit
- Max. 34.5 / 69 kVA power
- Automatic motor identification
- Minimal size
- Inverter Enable safety input
- 250% overload
- Integrated SERCOS interface

SH motor

Highly dynamic AC servo motors

The AC servo motors of the SH series meet the highest demands on dynamics and precision. Five flange sizes with different torque gradations offer the right drive solution for almost any application. New wind technology with single tooth winding allows for compact size and reduces production costs compared with traditional motors.

Compared to other AC servo motors, the SH motor has a low inherent moment of inertia and a high load capacity, which allow the SH motor to satisfy any demand with regard to precision, dynamics and efficiency.

SH motors are compatible with SM motors and are available in five different flange sizes:

- SH-055
- SH-070
- SH-100
- SH-140
- SH-205

Brief summary of technical data:

- Developed for the highest dynamics and precision
- Single tooth winding
- Compact size
- High power density
- Low inherent moment of inertia
- High load capacity
- High resistance to winding damage
- Low cogging torque

iSH Servo Drive System

PacDrive iSH

The innovative iSH combines motor, final stages and the digital servo regulator for one axis in a space-saving housing. Due to its compact construction with integrated controller it is perfectly suitable for peripheral set-up. It is available with single or multi-turn encoders and configures itself with the aid of the electronic type plate in the iSH itself.

The highlights

- compact design
- 3.5 times peak torque
- Integrated SERCOS interface
- High-resolution single or multi-turn encoder
- Protection class IP 65
- simple wiring
- superior reliability

PacDrive PS-5

The power supply unit PacDrive PS-5 features compact and autonomous design for control cabinet installation as well as state-of-the-art technology. All PacDrive iSHs are supplied using just one connecting cable via the quick to install PacDrive PS-5. Which means that the PS-5 fits seamlessly into the extremely flexible, modular drive concept.

The highlights

- Integrated mains filter and bleeder
- Intermediate circuit power for up to 16 iSH (depending on the application)
- Integrated SERCOS interface
- fully diagnosable due to integrated controller
- simple to assemble

PacDrive DB-5

PacDrive DB-5 is the link between PS-5 and iSH. Depending on the number of drives, anywhere from 1 to 4 iSH motors can be connected. When operating more than 4 drives simply expand the system using one or more DB-5s.

The highlight

- 1-4 connections for iSH motors or easily expandable with more DB-5s

4 Indicators and control elements, diagnosis

The PacDrive™ system supports the user with its comprehensive diagnostic system.
The diagnostic messages can be read out with the **EPAS-4** automation toolkit. The PacDrive™ system contains a powerful message logger in which additional diagnostic information is recorded.
The diagnostic messages are generally displayed on the machine via a control panel.
In the event of an "error", read the diagnostic message and contact your machine manufacturer.

NOTE

Detailed diagnostic information can be found in the online help section of the **EPAS-4** automation toolkit.

4.1 Indicators and control elements

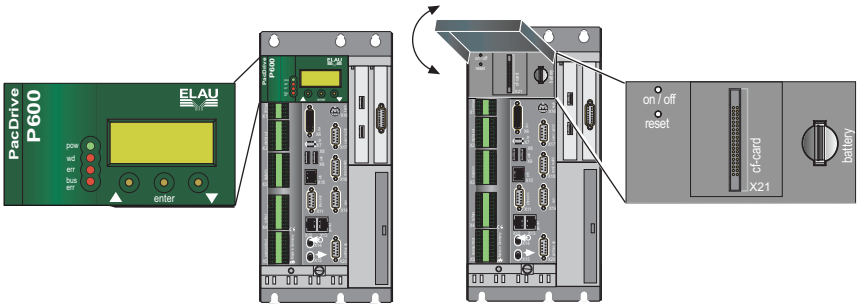


Figure 4-1: PacDrive controller P600 control unit

If the cover of the PacDrive controller is closed, you will see four vertically arranged indicators:

- pow (control voltage indicator)
- wd (watchdog indicator)
- err (error indicator)
- bus err (SERCOS real-time bus error indicator)

The LEDs signify various operating states or errors.

In addition to the LED displays, further information about the operating status of the PacDrive controller is given on the 4-line LCD display.

Line 1	firmware version currently in use
Line 2	current IP number of the PacDrive controller

The horizontally arranged buttons on the PacDrive controller currently have no function.

pow (control voltage display)

The "pow" LED indicates the state of the control voltage.

OFF	No control voltage (24 V) or too low.
ON	Normal operation; control voltage in normal range
Flashing	UPS active

wd (watchdog indicator)

Watchdog is a hardware module to monitor the controller.

OFF	Normal operation
ON	Fatal error; reset required, reboot system

In the event of a fatal error or activated watchdog, only the real-time system VxWorks of the PacDrive controller P600 must be restarted. If the Windows XP operating system is still running smoothly, a software reset of the real-time system must be performed via Windows XP, see also Switching on/off and resetting the PacDrive controller

NOTE

A "fatal error" is a serious hardware problem or an unexpected software problem. When a "fatal error" occurs

- the outputs are reset and
- the wd (Watchdog) relay outputs are opened.

err (error indicator)

The error LED (err) displays errors. The following table lists the possible display conditions and their accompanying error descriptions.

OFF	Normal operation
Flashes slowly (1.7 Hz)	Error of class 1, 2, 3, 4 or 5 active
Flashes quickly (10 Hz)	PacDrive controller boot completed, last boot failed. See diagnostic message 209 "last boot failed". PacDrive controller performed a minimal boot.
ON	A serious error occurred during current boot.

NOTE

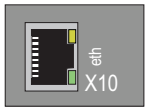
The err-LED is switched on following "Power on". Once the operating system, user configuration, user parameters and the IEC program have been loaded and the IEC program has been started successfully the err LED will switch off again. The boot procedure is then complete.

bus err (SERCOS real-time bus error indicator)

OFF	Normal operation
ON	Bus error (fiber optic cable connection problem, e. g. sending power too low or too high, cable break, ...)

NOTE

The condition of the bus err LED is undefined during the boot procedure. The sending power (fiber optic cable intensity) is set on the PacDrive controller in the controller configuration.



Ethernet LEDs (data throughput indicator and network activity)

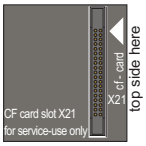
There are two LEDs affixed to the Ethernet connection (X10) of the PacDrive controller.

LED yellow: ON	PacDrive controller connected
LED yellow: flashing/flickering	current network traffic
LED yellow: OFF	PacDrive controller not connected
LED green: ON	100 MB connection
LED green: OFF	10 MB connection

Once you have opened the operating cover you have access to the PacDrive controller control elements:

- CompactFlashTM card slot
- Battery compartment
- on / off button
- reset button

4.1.1 CompactFlashTM card slot

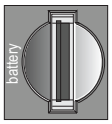


The CompactFlash™ card slot is the receptacle for a data storage medium (CF™ card) You do not need a CompactFlash™ card to operate the controller. The entire software used to operate the controller is stored on the hard disk. The CompactFlash™ card is only used as additional data storage for service purposes. Note that no Compact-Flash™ card may be used with the devices.

NOTE

Do not insert any CF™ card into the slot except for service purposes! If a Compact-Flash™ card is inserted, malfunctions may occur on the hard disk or the DVD Rom drive. The real-time system and the firmware are stored on the hard disk. The Com-pactFlash™ card is not required to operate the controller.

4.1.2 Battery compartment



The PacDrive controller battery buffers controller data (Bios, NVRAM, time, etc.). As a general rule the battery should be replaced every 6 years. After this period of time the battery must be replaced. If the device (with battery inserted) is not used for an extended period of time, you should check/replace the battery. You can measure the battery charge by removing the battery and measuring manually or by using the con-venient PacDrive controller diagnostic system. You can also note the diagnostic message **"037 battery dead"** in your IEC program and if necessary display it by putting the message on an HMI (panel). From the time the diagnostic message is first issued you still have about 3 days to change the battery. You can change the battery while

the controller is on or off. There is no loss of data when it is performed with the controller on. When the controller is switched off, the time period allotted for data buffering without battery is approx. 5 minutes.

Change the battery as follows:

If it is necessary to change the battery, use the following type of battery: 3V Lithium Renata Type battery 2450N, see also chapter entitled Accessories (see 6.8.3 Accessories).

Replace battery only with Renata Type 2450N. There is a risk of explosion/fire if another battery is used, see also chapter entitled General safety information (see 6.8.3 Accessories).

► Use insulated pliers to lightly pull the old battery out of its slot.

⚠ WARNING

Danger of explosion when removing/replacing battery!
Risk of injury and/or property damage!
- Use suitable, insulated pliers. When replacing the battery use tools which contain no current conducting material on the contact points.
- In general, be careful not to short circuit the battery poles.
- Do not recharge, dismantle or throw battery into fire.

► Carefully place the new battery on the guide and lightly push it into the device.

4.1.3 Switching the PacDrive controller P600 on/off and resetting

The PacDrive Controller P600 is equipped with the VxWorks real-time system and the Windows XP operating system. Take into account both systems when switching the controller on/off or resetting the controller.

You can only restart the VxWorks real-time system or Windows XP and VxWorks (perform reset).

Restarting the VxWorks real-time system:

- Restarting VxWorks via the Automation Toolkit EPAS-4 (reset)
- Restarting VxWorks via the Tool PacDrive Settings (reset)

Restarting Windows XP and VxWorks:

- Shut down Windows XP properly with the option (restart) or shut down (on/off)
- Interrupt power supply.
  This activates the controller's supply via the UPS and shuts down Windows XP (on/off)

⚠ CAUTION
The system is not in a secure position. Proper shutdown of the system cannot be guaranteed! **Destruction of system or damage to parts of system possible!** ▪ Put system in a secure position ▪ Restarting Windows XP and VxWorks ▪ If necessary, program the IEC application to put the system into a secure position before shutting down (control via IEC Event Task and Shutdown Event)

Procedure for switching the PacDrive controller on/off and resetting it:

on / off button

Button used to switch the PacDrive controller on/off.

► Press button when the PacDrive Controller P600 is switched off, completely wired and connected to the power supply.
✓ Device switches on.
► Press button when system is running.
✓ The controller switches the device off.
► If necessary, put the system in a secure position before switching it off.

If only the VxWorks real-time system is to be restarted, use the Software-Tool "PacDrive Settings" or the Automation Toolkit EPAS-4 to perform a reset.
If Windows XP does not run smoothly anymore first check to see whether a proper shutdown of Windows XP is still possible and perform a restart as follows (Windows restart via "Start" -> "Turn off computer" -> "Restart").
In the event of a drop in supply voltage (power failure etc.) the power supply of the controller is automatically activated via the UPS system. The controller is shut down after a predefined period of time. This possibility makes it absolutely necessary that via the IEC application the system be put into a secure position. Because the incidence of this type of situation cannot be predicted and thus the possibility of manually driving into a safe position is not an option.

reset button

Button used to reset the PacDrive controller When the reset button is activated, only the PacController controller is rebooted. Any MC-4 servo amplifiers connected have their own reset buttons.

Activate the reset button only if neither system, Windows XP or VxWorks, is running smoothly.

⚠ DANGER
The system is not in a secure position. Proper shutdown of the system cannot be guaranteed! **Destruction of system or damage to parts of system possible!** ▪ Manually put system into a secure position

When the reset button is pressed the PacDrive controller is rebooted (VxWorks real-time system and Windows XP operating system).

PacDrive Controller P600 and UPS

The PacDrive controller is ready for use of an internal UPS (optional). ELAU strongly recommends using a UPS system because data loss cannot be ruled out in the event of a power failure or interruption of the supply voltage. Windows XP and the real-time system can only be properly shut down with an appropriate unit.

PacDrive controller boot procedure

First, Windows XP is started. In the meantime, Windows starts the real-time system. The real-time system then takes over control via the CPU distribution. As a result Windows will only be executed as a low priority task in the framework of the real-time system.

Windows XP in safe mode

If the Windows XP operating system starts in safe mode, the controller's real-time system is not started.

4.2 Diagnosis

4.2.1 PacDrive controller minimal boot

If a serious boot error occurs as a result of an application error, the user can perform a minimal boot.

The PacDrive controller automatically performs a minimal boot if:

- a voltage interruption of the control voltage occurs when starting the controller while the "err" indicator is illuminated
- a reset of the PacDrive controller is issued
- a serious error occurs (memory call up cannot be performed)

During a minimal boot the application data (PLC configuration and IEC program) are not loaded.

Perform a minimal boot as follows:

► Boot the PacController by pressing the **"reset"** button.
✓ The PacController starts and the **"err"** error indicator lights up.
► **Press the "reset** button again while the pre-set IP address is displayed.
✓ After the boot, the PacDrive controller will flash quickly (10 Hz), signaling a minimal boot.

4.2.2 Connection to PacDrive controller

TCP / IP address conflicts in the network

The PacDrive controller P600 works with three network addresses. For the two integrated systems (real-time system VxWorks and the Windows XP operating system) the distribution is designed as follows.

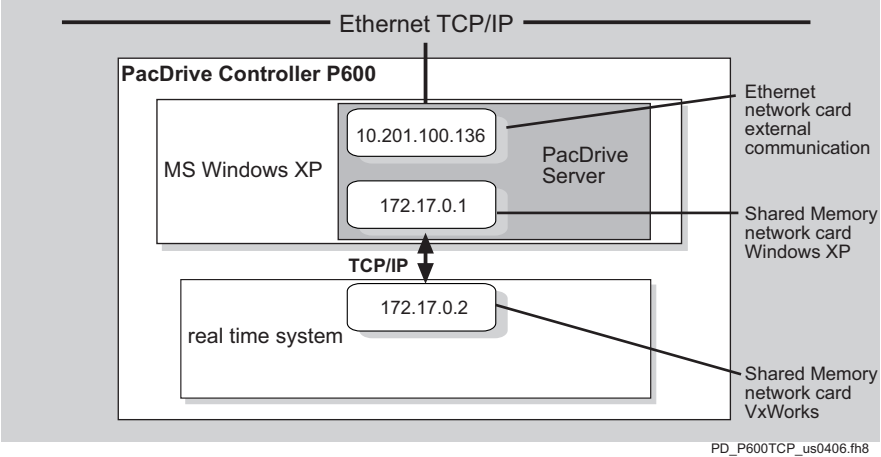


Figure 4-2: PacDrive Controller P600 internal distribution of the network addresses

If the address range of the Windows XP Ethernet network card for the external communication is the same address range as the two IP addresses for the communication with the real time system (see illustration: PacDrive Controller P600 internal distribution of the network addresses), the controller internal network communication is disturbed. In this case change the IP address of the real-time system. Refer to the programming manual for further information regarding the configuration of the PacDrive controller P600.

4.2.3 Example of a diagnostic message

Diagnostic message 2121 "braking resistor temperature too high" is displayed.

Meaning of diagnostic message:

- Class 2 error
- Diagnostic code 121

The meaning of the diagnostic code is more thoroughly explained in the online help section of the EPAS-4 automation toolkit.

121 braking resistor temperature too high

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): B

The braking resistor is overloaded.

- The drive has incorrect dimensions.
- ► Check drive sizing.

- Hardware error: The braking resistor or addressing is defective.
- ► Contact ELAU customer service.

A complete list of the diagnostic messages can be found in the chapter entitled Diagnostic messages (see 8 Diagnosis).

5 Transport, storage, unpacking

Transport

- Avoid heavy shocks and/or vibrations.
- Check each device for transport damage and inform the shipping company immediately if necessary.

Storage

- Store the devices in a clean, dry room.
- The air temperature should be between - 25 C and + 70°C.
- Temperature variations must not exceed 30 K per hour.

Unpacking

- Check that delivery is complete.
- Check all devices for transport damage.

Type plate

The type plates contain all important information:

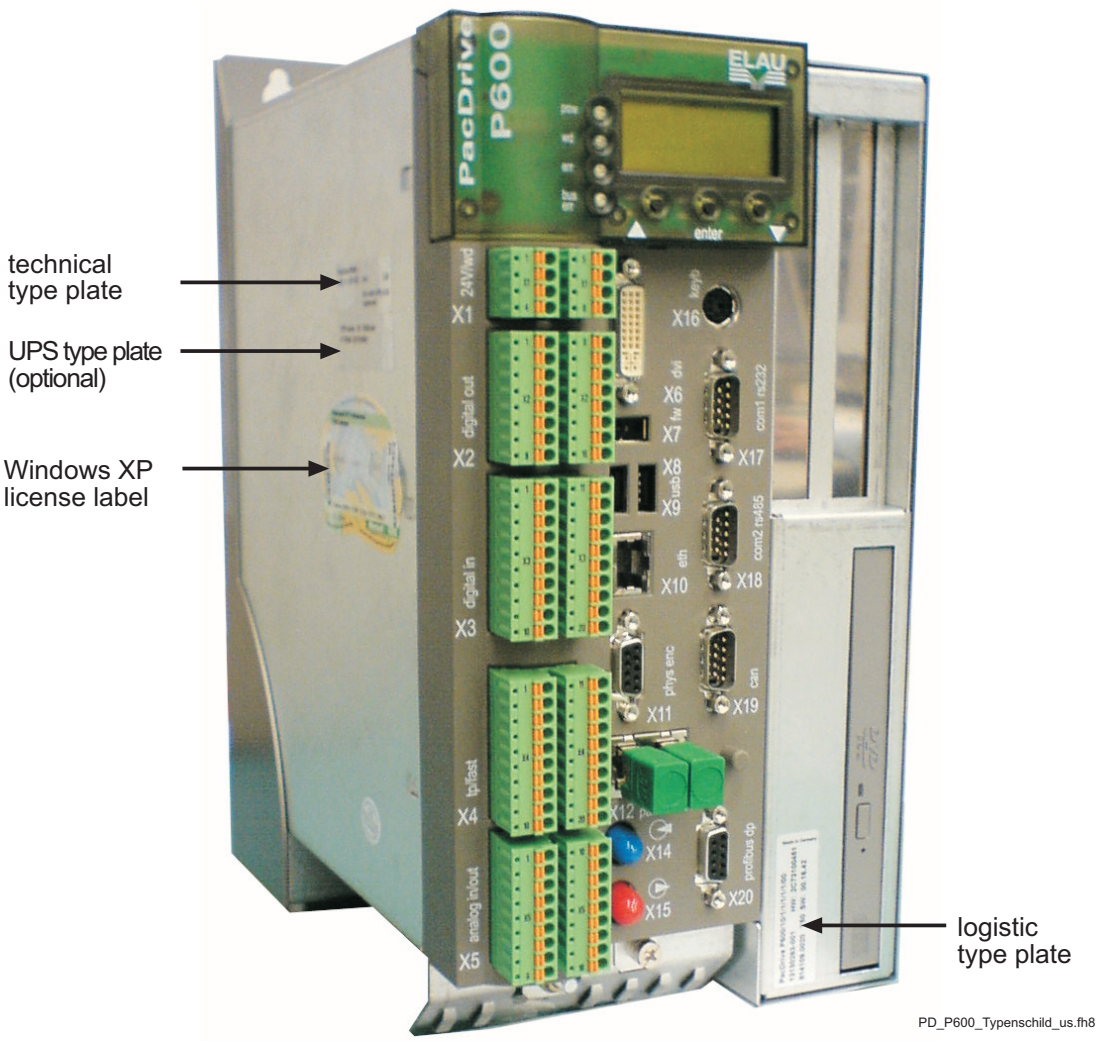


Figure 5-1: Type plates on PacDrive controller P600

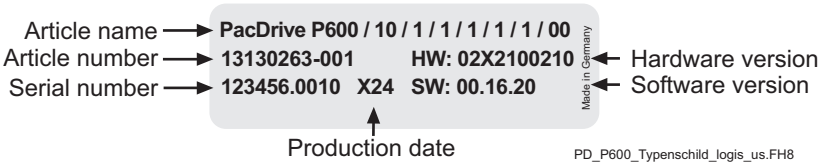


Figure 5-2: Logistic type plate of a PacDrive controller P600

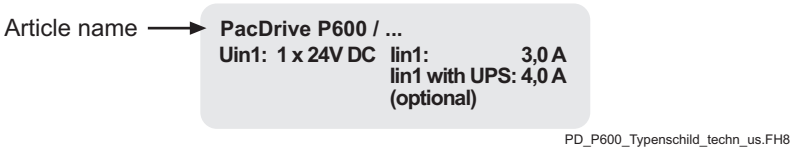


Figure 5-3: Technical type plate of a PacDrive controller P600

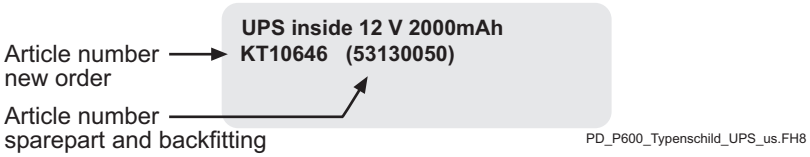


Figure 5-4: Type plate for optional USV

6 Servicing

Quick detection and elimination of errors helps keep production losses to a minimum when machines break down .

The PacDrive™ system diagnostic messages can be called up via the EPAS automation toolkit and enable targeted and effective troubleshooting.

In the event of a breakdown it is possible to smoothly replace defective components to guarantee that the fault is quickly eliminated and operation can be resumed. These jobs may only be carried out by qualified maintenance personnel.

When returning a defective device to ELAU customer service, we would ask that you complete the error report in the appendix.

6.1 Spare Parts

To ensure that the equipment functions constantly and is always ready to go it is important to have a supply of the most important components on hand.

⚠ CAUTION

Incompatible replacement device!
System may not be working properly following component replacement!
- Devices may only be replaced by devices with the same hardware configuration and software version.

Indicate the following information on the spare part order:

Item name:	e. g. C600/10/1/1/1/00
Item no.	e. g. 13130262
Hardware code:	e.g. HW: 02200100
Software version:	e.g. SW: 00.16.20

This information can be found on the type plate of the equipment, see also Transport, storage, unpacking, in the PLC configuration of the PacDrive™ system.

6.2 Repairs

Please ensure that you complete the error report in the appendix when sending back defective components. You can also copy the error report and send it by fax.

NOTE

To avoid damage in transport and to guarantee that the repair process goes smoothly, follow the method outlined in the chapter entitled "Device Replacement".

6.3 EMC Rules

The mains voltage is stored by rectification in the DC circuit of the servo amplifier to control and regulate the motors. This stored power is supplied to the motor by precise on and off switching using six semi-conductor switches. The steep rise and fall in voltage puts considerable demands on the isolating stability of the motor winding. An important additional aspect to observe is the **e**lectro**m**agnetic **c**ompatibility (EMC) with other system components. The great edge steepness of the pulsed voltage generates very intense harmonic oscillations that extend into the high-frequency range.

Observe the following EMC rules:

- During installation, select the HF grounding option with the lowest Ohm load (e.g. an uncoated mounting plate on the switching cabinet).
- Ensure electrical contact areas are as large as possible (skin effect). If necessary, remove any paint.
- Lay the grounding in a star configuration from the central earthing point to the corresponding connections. Looping the grounding is not permitted and can cause unnecessary influences.
- Only use shielded cables.
- Supply large-area shielding bridges. (Connecting shields via the PIN contacts of connectors is not permitted.)
- You must observe the recommendations for circuits and switches.
- Shorten the motor cable to a minimal length.
- Do not lay any cable loops in the switching cabinet.

⚠ CAUTION
Electromagnetic fields System errors or system failure may occur. ▪ Observe the following rules during installation to eliminate the results of excessive errors and failure as much as possible.

- When using electronic controls, do not allow any kind of inductive load without the appropriate interference suppression.
- Appropriate interference suppression is achieved during direct current operation by using recovery diodes and by using protector type-based, industry-standard quenching circuits during alternating current activity.
- Only a suppression element that is arranged directly on the inductance fulfills the purpose. In some cases even more interference may be generated by the shock of the switching current on the interference suppression lines. It is far easier to avoid the source of interference than to eliminate the effects of existing interference.
- Contacts that do not switch suppressed inductive loads should never be arranged in a room with ELAU PacDrive components. The same applies for connection lines that do not lead suppressed, switched inductances and lines that run parallel to them. Isolate the control from such interference sources using a Faraday cage (separately partitioned switching cabinet).

⚠ CAUTION
Electromagnetic fields
System errors or system failure may occur.
- Mains filters and motor filters may by used depending on the combination of the servo amplifier/motor and the cable length.
  Refer to the project planning guide for the PacDrive™ system.

6.4 Device replacement

In addition to the information given below, please also observe the machine manufacturer's instructions when replacing the PacDrive controllers.

Replace PacDrive controller:

► Take preliminary measures.

⚠ DANGER
High voltage!
Risk of death!
- Open the master switch and secure it against switching on again before working on electrical machinery.
- Ensure that the drives are at a standstill as life threatening voltages can occur in the motor lines of servo motors in generator mode.
- Disconnect the plug-in connectors that are not live.

⚠ CAUTION
Electrostatic discharge!
Damage to component possible!
- Touch circuit boards only on edges. Do not touch any of the circuit points or components.
- Before touching the circuit boards you should remove any static loads. When doing so, first touch a grounded metallic surface such as the housing.
- Do not put the circuit boards on a metal surface.
- Avoid the production of electrostatic charge by having suitable clothing, carpets and furniture and by moving the boards as little as possible.

► Open master switch.
► Secure it against being re-energized.
► Disconnect connecting lines from the PacDrive controller.
► Loosen screws on the top and bottom of the housing.
► Remove PacDrive controller

⚠ CAUTION
Electrostatic discharge!
Damage to component possible!
- Use the original or similar packaging to send back electronic parts. The components must be packed in ESD packaging/foil or the warranty is void.

► Install new PacDrive controller and tighten screws.
► Connect new PacDrive controller according to machine's circuit diagram.

For commissioning you can proceed in one of two ways:

- either import the user project again using a PC on which the automation toolkit EPAS-4 is installed

- or remove the controller's already used CompactFlash card in need of repair and insert it into the new controller. (Ensure that the card is functional.)

- ► Store the PacDrive controller in need of repair in a suitable package for transport.
- ► Put the system into operation again.

6.5 Cleaning

When correctly installed the devices are largely maintenance free. Dust and contaminants predominantly due to cool air currents can be removed by disconnecting the devices from the mains, dismantling them and blowing them out with dry compressed air (maximum 1 bar).

6.6 Commissioning

We strongly recommend using ELAU staff for the initial start-up.
This is not only for reasons of warranty but at the same time

- the equipment will be checked,
- the optimal configuration recorded and
- operating staff can be instructed.

Procedure for initial start-up:

Unpack and inspect

- ► Remove packaging.
- ► Check devices for sound condition. Only put undamaged devices into operation.
- ► Check delivery for completeness.
- ► Check for correct assignment of optional plug-in positions.
- ► Check data against type plates.

Refer also to chapter entitled Device Replacement (see 6.4 Device replacement).

Installation

- ► Observe requirements of installation site.
- ► Observe requirements of the protection class and the EMC regulations.
- ► Install devices.

Refer also to chapter entitled Maintenance.

Connect to electricity

- ► Connect devices, beginning with the ground conductor.
- ► Check that terminals are secure and check necessary cable cross sectional areas for correctness.
- ► Check for smooth execution of shielding, rule out short circuits and breaks.

Refer also to chapters entitled Technical information and Maintenance.

Connect control voltage (24V)

- ► Check the power supply voltage and control voltage.

- ▸ Connect external 24V control voltage.
- ✓ The PacDrive controller initializes and the LEDs should display the following :
  - pow: ON
  - err: ON
  - buserr: not defined
  - wd: ON
- ✓ Following the boot the following conditions should be reached:
  - pow: ON
  - err: OFF
  - buserr: OFF
  - wd: OFF

Refer also to chapter entitled Diagnosis.

Check safety functions

- ▸ Check motor thermal contact or PTC (see operating instructions for connected components).
- ▸ Check brake function (if present).
- ▸ Check EMERGENCY STOP chain and EMERGENCY STOP limit switch

Connect mains voltage

- ▸ Activate EMERGENCY STOP switch.
- ▸ Connect mains voltage.
- ▸ Check status displays for proper function.
- ▸ Disconnect EMERGENCY STOP switch.

Move axis

- ▸ Use a reliable, small application program when moving axis for the first time in order to :
  - check the correct direction of rotation of the axis
  - check the correct setting of the limit switch
  - check the braking distance in both directions

Transmit configuration and program

- ▸ Transfer project with the EPAS-4 automation toolkit to the PacDrive controller.

⚠ DANGER

Hazardous movements!

Risk of death, serious injury or property damage!

- Ensure that no one is in the danger zone.
- Remove all tools, loose parts and other working aids not belonging to the axis/ machine/system from the area of movement. (Ensure machine is in operating state!)
- ELAU recommends waiting to engage the engine until after the function tests have been successfully performed!

Perform function test

- ▸ Check devices and wiring again.
- ▸ If you haven't already done it, connect the mains voltage.
- ▸ Carry out function test using a checklist for axis/machine/system functions.

Continue start-up of system

- ▸ Continue to put system into operation according to packaging machine manufacturer's operating instructions.

6.7 Configuration / programming

The PacDrive™ system is adapted to your task using the EPAS-4 automation tool-kit.
In EPAS-4, the system is configured and programmed in accordance with IEC 61131-3.

⚠ CAUTION

Complex functionality of PacDrive™ system and the machine!
Property damage possible!

- Program changes may only be carried out by trained personnel with in-depth knowledge of the system. In other words, changes may only be carried out by your machine supplier or by ELAU employees. ELAU AG is not liable for damages caused by unauthorized program changes.

6.8 Order numbers

6.8.1 PacDrive controller P600

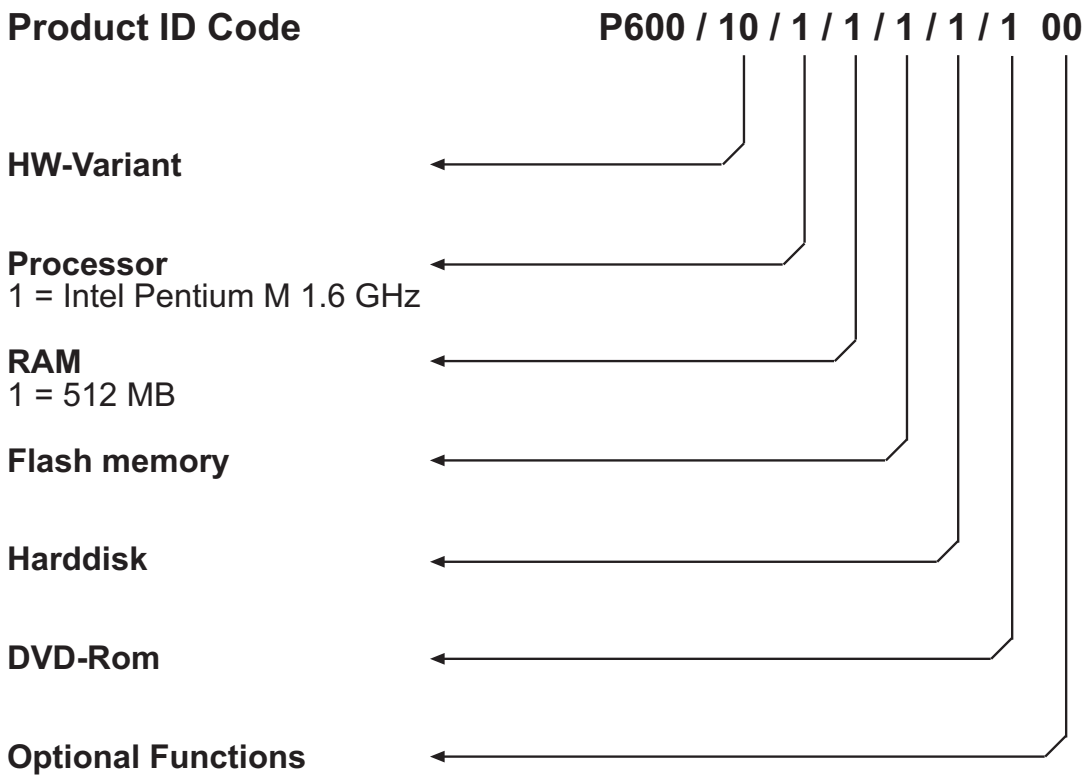


Figure 6-1: Type code PacDrive controller P600

Order number	Item name:	Explanations
13 13 02 63	PacDrive P600 / 10 / 1 / 1 / 1 / 1 / 1 / 00	P600

Table 6-1: Order numbers and variants of the PacDrive controller P600

6.8.2 Cable

Encoder cable

Order number	Item name:	Explanations
15 15 42 11-XXX	E-FB-065 MAx-SIN-ME UL	on C400/C600/P600 (**X11**)
15 15 42 12-XXX	E-FB-066 MAx-SIN-ME	on C400/C600/P600 (**X11**)
15 15 42 19	E-FB-076	Incremental encoder on C400/C600/P600 **(X11)**

Table 6-2: Order numbers of encoder cables

Interface cable

Order number	Item name:	Explanations
15 15 43 01	E-SS-054 (PC)	on C400/C600/P600 **(X17)** COM1
15 15 43 03-XXX	E-SS-056 REAL-TIME-BUS	on MC-4 (**X5 / X6**) on C400/C600/P600 (**X14 / X15**)
15 15 43 04-030	E-SS-057 (PC)	on MC-4 **(X7)**

Table 6-3: Order numbers of interface cables

6.8.3 Accessories

Order number	Item name:	Explanations
13 13 02 57	Bus terminal BT-4/DIO1	for PacNet
13 13 02 64	Bus terminal BT-4/ENC1	for PacNet
17 19 50 04	ME/SINCOS SRS50 STAND ALONE	Master encoder
17 19 50 05	ME/SINCOS SRM50 KVAF MULTITURN	Master encoder
17 19 10 19 - 003	Incremental master encoder DG 60 LWSR 5,000 increments/rotation	Master encoder
17 19 10 19 - 006	Incremental master encoder DG 60 LWSR 10,000 increments/rotation	Master encoder
ME 08600	"High voltage" warning sticker	105 mm x 52 mm
KT 10592 UPS	Battery 3 V Lithium Renata CR2450N	(Maintenance interval 6 years)
15 15 44 14-xxx	DeviceNet Adapter (one slave)	up to max. 3 m cable length
15 15 44 15-xxx	DeviceNet Adapter (multi-slave)	up to max. 3 m cable length; including adapter

Table 6-4: Order numbers of accessories

7 Technical information

7.1 General

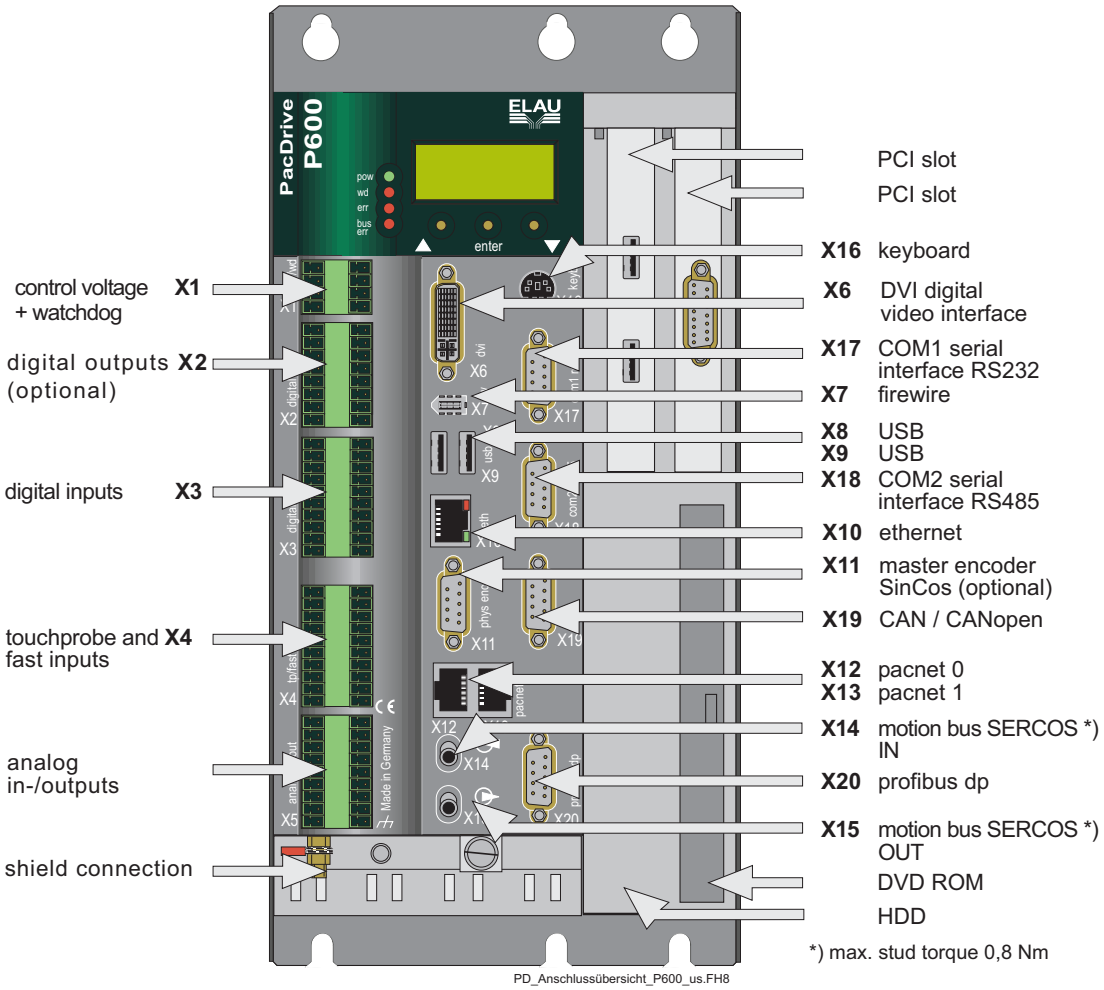
	Parameters	Value
Product configuration	Type code - P600 up to 22 SERCOS nodes (SERCOS nodes MC-4, SCL, iSH)	PacDrive P600 / 10 / 1 / 1 / 1 / 1 / 00
	Order number - P600 up to 22 SERCOS nodes	13 13 02 63 - 001
Processor	CPU	Intel Pentium M 1.6 GHz
	RAM	512 MB
	L2 Cache	1 MB
	NVRAM	256 kB
	CompactFlashTM card **(X21)**	not required
	Real time clock (RTC)	yes (battery maintenance interval: 5 years)
	Watchdog	yes (max. 60 V < 2 A)
	Diagnosis	alphanumeric diagnostic display, Status LEDs
PC configuration	HDD	40 GB
	DVD-ROM	8 x DVD / 24 x CD-ROM
	PS2 **(X16)**	Number: 1
	USB 2.0 **(X8 / X9)**	Number: 2
	IEEE1394 (FireWire) **(X7)**	Number: 1
	DVI (VGA) **(X6)**	Number: 1
	PCI slots	Number: 2
Operating system	Real-time operating system Applications operating system	VxWorks RT Windows XP
Programming languages	Programming language IEC 61131-3 (CFC can also be used)	Instruction list (IL) Ladder diagram (LD) Function block diagram (FBD) Sequential function chart (SFC) Structured text (ST) Continuous function chart (CFC)
Interfaces	serial interfaces COM1 COM2	 RS232 (**X17**) RS485 (**X18**)
	Network connection	Ethernet (10/100 Base-T) (**X10**)
	Field bus connection	PROFIBUS DP Master/Slave (12 MBaud) (**X20**) or CAN (2.0A) or CANopen (**X19**) DeviceNet Slave [2)] Ethernet/IP Adapter [1)] EtherNet/IP Scanner[1)] (projected) [1)] optional hardware module required [2)] cable adapter required

	Parameters	Value
	Real-time bus interface	SERCOS interface (16 MBaud) (**X14**, **X15**)
	PacNet interface	2 PacNet interfaces (**X12**, **X13**)
	Master encoder interface	1 SinCos master encoder or 1 incremental master encoder (**X11**)
	HMI interface	User display devices: RS485 (Modbus or PROFIBUS DP) HMI software tools: OPC server for PacDrive controller P600 (Windows XP) or for an additional PC (Windows NT/2000/XP or Windows CE)
	Diagnostic interface for remote maintenance	Web server or modem
	Communication protocols	http, ftp, SMTP (email)
	integrated trace recorder (software oscilloscope)	8 channels resolution 1 ms
	integrated data logger for diagnostic messages	27 kB
Output	Actuator power	8 servo axes: SERCOS cycle time 1 ms 14 servo axes: SERCOS cycle time 2 ms 22 servo axes: SERCOS cycle time 4 ms max. of 255 parallel motion profiles possible
	PLC output	Time for 1000 Bit instructions: 4 µs unlimited number of PLC processes Type of PLC processes: continuous, periodic or event-driven Cycle time fast task: 250 µs nominal I/O response time: 500 µs (read in data, process, set output)
Cam switch group	Cam switch group	max. 256 cams dynamic switch group Outputs: Memory or digital outputs Inputs: external master encoder, virtual master encoder, axis position Processing time: 250 µs
I/Os	digital inputs **(X3)**	Number: 20 (IEC61131-2) Range U_{IN} 0 Voltage: DC 0 ... 6 V Range U_{IN} 1 Voltage: DC 20 ... 33 V input current: I_{IN} = 5 mA at U_{IN} = 24 V polarized yes input filter: 1 or 5 ms can be parameterized
	analog inputs **(X2)**	Number: 2 Range U_{IN}: -10 ... 10 V; Resolution 12 Bit, 5 mV (Resistance 100 kOhm) or Range I_{IN}: 0 ... 20 mA; Resolution 12 Bit, 5 µA (Resistance 500 Ohm)
	Interrupt inputs **(X4)**	Number: 4 (IEC61131-2) Range U_{IN} 0 Voltage: DC 0 ... 6 V Range U_{IN} 1 Voltage: DC 20 ... 33 V input current: I_{IN} = 5 mA at U_{IN} = 24 V polarized yes input filter: 0.1 or 1 ms can be parameterized

	Parameters	Value
	Touchprobe inputs **(X4)**	Number: 16 (IEC61131-2) Range U_{IN} 0 Voltage: DC 0 ... 6 V Range U_{IN} 1 Voltage: DC 20 ... 33 V input current: I_{IN} = 5 mA at U_{IN} = 24 V polarized yes input filter TP0 to TP15: 100 µs resolution TP0 to TP15: 10 µs at a cycle time of 1, 2, 4 ms
	digital outputs **(X2)**	Number: 16 (IEC61131-2) Output voltage: (+UL-3 V) < U_{OUT} < +UL Rated current: I_e = 250 mA per output Inrush current I_{emax} < 2 A for 1 s Leakage current 0 signal: < 0.4 mA Transmission time: 100 µs Short-circuit proof: yes Supply outlet: DC 24 V (-15% / +25%) / 3 A
	digital outputs **(X5)**	Number: 2 Range U_{OUT}: -10 ... 10 V; Resolution 12 Bit (5 mV); Load > 5 kOhm (max. offset < +/-75 mV)
	additional digital and analog I/Os	via field bus max. 3,584 bytes digital/analog inputs and max. 3,584 bytes digital/analog outputs max. number of stations: 126 (PROFIBUS)
	additional fast digital I/OS	via PacNet max. 128 inputs and 128 outputs
	additional Touchprobe inputs	via PacNet max. 128 Touchprobe inputs
Power supply	Power supply unit	DC 24 V (-15% / +25%) / max. 3.0 A without UPS and 4.5 A with UPS
	Power consumption	max. 85 W
	Uninterruptible power su pply (UPS)	internal, optional (maintenance interval 3 years)
Dimensions and ambient conditions	Dimensions Dimensions packaging	see chapter Dimensions Width: 180 mm Height: 400 mm depth: 300 mm
	Weight Weight with packaging	5.6 kg 6.2 kg
	Ambient conditions - Protection class - Ambient temperature - Insulation class - relative humidity	 IP 20 +5...+55 °C (Operating temperature without UPS) +5...+40 °C (Operating temperature with UPS) -25...+70 °C (Storage and transport without UPS) -25...+50 °C (Storage and transport with UPS) Degree of pollu-tion 2 ..., no thawing 5% ... 85% climatic category 3K3 EN 60 721
Approval	Approval	CE, UL , cUL

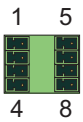
Table 7-1: Technical information PacDrive controller P600

7.2 Connection overview



7.3 Electrical connections

X1 - Control voltage and watchdog



Pin	Designation	Meaning	Range	Max. cross section
1	DC +24 V	Supply voltage	- 15 % / +25 %	1.5 mm²
2	DC 0 V	Supply voltage		1.5 mm²
3	+UL	for digital outputs	DC +24 V -15 % / +25 %	1.5 mm²
4	L0	for digital inputs/outputs		1.5 mm²
5	DC +24 V		-15 % / +25 %	1.5 mm²
6	DC 0 V	Supply voltage		1.5 mm²
7	WD	Watchdog relay		1.5 mm²
8	WD	Watchdog relay		1.5 mm²

Table 7-2: Electrical connections C400/C600/P600 / X1

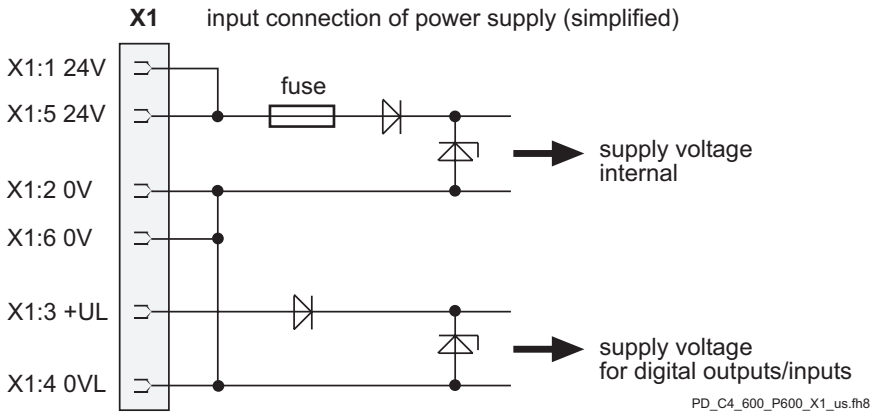


Figure 7-1: Electrical connections C400/C600/P600 / X1 input connection

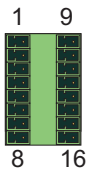
⚠ CAUTION

Switching off the control voltage!

Data loss possible!

- Use a UPS. Only switch off the control voltage of the PacDrive controller after the Windows XP operating system has been properly shut down and the axes of the system are in a safe position. Refer also to the EPAS-4 online help function *Sys-Shutdown()*.

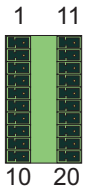
X2 - Digital outputs



Pin	Designation	Meaning	Range	Max. cross section
1	O.00	digital output 1	DC 20 ... 30 V	1.5 mm²
2	O.01	digital output 2	DC 20 ... 30 V	1.5 mm²
3	O.02	digital output 3	DC 20 ... 30 V	1.5 mm²
4	O.03	digital output 4	DC 20 ... 30 V	1.5 mm²
5	O.04	digital output 5	DC 20 ... 30 V	1.5 mm²
6	O.05	digital output 6	DC 20 ... 30 V	1.5 mm²
7	O.06	digital output 7	DC 20 ... 30 V	1.5 mm²
8	O.07	digital output 8	DC 20 ... 30 V	1.5 mm²
9	O.08	digital output 9	DC 20 ... 30 V	1.5 mm²
10	O.09	digital output 10	DC 20 ... 30 V	1.5 mm²
11	O.10	digital output 11	DC 20 ... 30 V	1.5 mm²
12	O.11	digital output 12	DC 20 ... 30 V	1.5 mm²
13	O.12	digital output 13	DC 20 ... 30 V	1.5 mm²
14	O.13	digital output 14	DC 20 ... 30 V	1.5 mm²
15	O.14	digital output 15	DC 20 ... 30 V	1.5 mm²
16	O.15	digital output 16	DC 20 ... 30 V	1.5 mm²

Table 7-3: Electrical connections C400/C600/P600 - X2

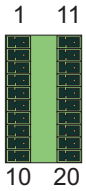
X3 - Digital inputs



Pin	Designation	Meaning	Range	Max. cross section
1	I.00	digital input 0	DC 20 ... 30 V	1.5 mm²
2	I.01	digital input 1	DC 20 ... 30 V	1.5 mm²
3	I.02	digital input 2	DC 20 ... 30 V	1.5 mm²
4	I.03	digital input 3	DC 20 ... 30 V	1.5 mm²
5	I.04	digital input 4	DC 20 ... 30 V	1.5 mm²
6	I.05	digital input 5	DC 20 ... 30 V	1.5 mm²
7	I.06	digital input 6	DC 20 ... 30 V	1.5 mm²
8	I.07	digital input 7	DC 20 ... 30 V	1.5 mm²
9	I.08	digital input 8	DC 20 ... 30 V	1.5 mm²
10	I.09	digital input 9	DC 20 ... 30 V	1.5 mm²
11	I.10	digital input 10	DC 20 ... 30 V	1.5 mm²
12	I.11	digital input 11	DC 20 ... 30 V	1.5 mm²
13	I.12	digital input 12	DC 20 ... 30 V	1.5 mm²
14	I.13	digital input 13	DC 20 ... 30 V	1.5 mm²
15	I.14	digital input 14	DC 20 ... 30 V	1.5 mm²
16	I.15	digital input 15	DC 20 ... 30 V	1.5 mm²
17	I.16	digital input 16	DC 20 ... 30 V	1.5 mm²
18	I.17	digital input 17	DC 20 ... 30 V	1.5 mm²
19	I.18	digital input 18	DC 20 ... 30 V	1.5 mm²
20	I.19	digital input 19	DC 20 ... 30 V	1.5 mm²

Table 7-4: Electrical connections C400/C600/P600 - X3

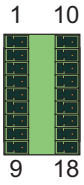
X4 - Touchprobe and fast digital inputs



Pin	Designation	Meaning	Range	Max. cross section
1	T.00	Touchprobe input 0	DC 20 ... 30 V	1.5 mm²
2	T.01	Touchprobe input 1	DC 20 ... 30 V	1.5 mm²
3	T.02	Touchprobe input 2	DC 20 ... 30 V	1.5 mm²
4	T.03	Touchprobe input 3	DC 20 ... 30 V	1.5 mm²
5	T.04	Touchprobe input 4	DC 20 ... 30 V	1.5 mm²
6	T.05	Touchprobe input 5	DC 20 ... 30 V	1.5 mm²
7	T.06	Touchprobe input 6	DC 20 ... 30 V	1.5 mm²
8	T.07	Touchprobe input 7	DC 20 ... 30 V	1.5 mm²
9	T.08	Touchprobe input 8	DC 20 ... 30 V	1.5 mm²
10	T.09	Touchprobe input 9	DC 20 ... 30 V	1.5 mm²
11	T.10	Touchprobe input 10	DC 20 ... 30 V	1.5 mm²
12	T.11	Touchprobe input 11	DC 20 ... 30 V	1.5 mm²
13	T.12	Touchprobe input 12	DC 20 ... 30 V	1.5 mm²
14	T.13	Touchprobe input 13	DC 20 ... 30 V	1.5 mm²
15	T.14	Touchprobe input 14	DC 20 ... 30 V	1.5 mm²
16	T.15	Touchprobe input 15	DC 20 ... 30 V	1.5 mm²
17	T.16	Touchprobe input 16	DC 20 ... 30 V	1.5 mm²
18	T.17	Touchprobe input 17	DC 20 ... 30 V	1.5 mm²
19	T.18	Touchprobe input 18	DC 20 ... 30 V	1.5 mm²
20	T.19	Touchprobe input 19	DC 20 ... 30 V	1.5 mm²

Table 7-5: Electrical connections C400/C600/P600 - X4

X5 - analog inputs/outputs



Pin	Designation	Meaning	Range	Max. cross section
1	AI.0 +	Analog input 0+		1.5 mm²
2	J.0 +	Br. current input 0 +		1.5 mm²
3	AI.0 -	analog input 0-		1.5 mm²
4	A.GND 0	analog ground 0		1.5 mm²
5	12 V Out 0	Output voltage 0	12 V	1.5 mm²
6	PE	shield		1.5 mm²
7	AO.0	analog output 0	-10...+10 V	1.5 mm²
8	A.GND AO.0	analog ground 0		1.5 mm²
9	PE	shield		1.5 mm²
10	AI.1 +	Analog input 1+		1.5 mm²
11	J.1 +	Br. current input 1 +		1.5 mm²
12	AI.1 -	analog input 1-		1.5 mm²
13	A.GND 1	analog ground		1.5 mm²
14	12 V Out 1	Output voltage 1	12 V	1.5 mm²
15	PE	shield		1.5 mm²
16	AO.1	analog output 1	-10...+10 V	1.5 mm²
17	A.GND AO.1	analog ground		1.5 mm²
18	PE	shield		1.5 mm²

Table 7-6: Electrical connections C400/C600/P600 - X5

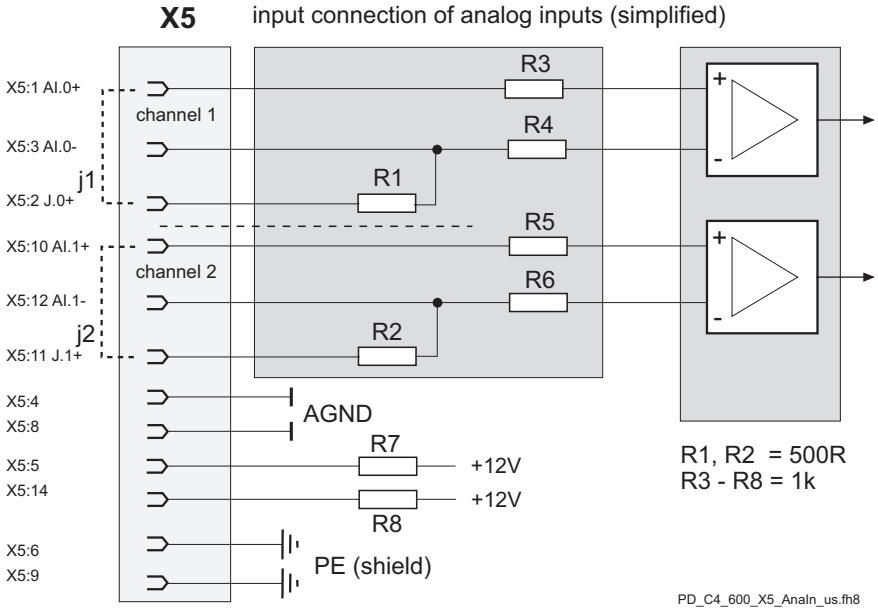
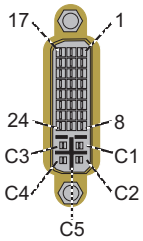


Figure 7-2: Electrical connections C400/C600/P600 / X5 input connection

X6 - DVI

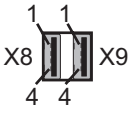


Pin	Designation	Meaning	Range	Max. cross section
1	RX2 -	data2 -		
2	RX2 +	data2 +		
3	GND	GND (data2/4 shield)		
4	N.C.	reserved		
5	N.C.	reserved		
6	DDC Clock	DDC clock		
7	DDC DAT	DDC data		
8	N.C.	Analog V-sync		
9	RX1 -	data1 -		
10	RX1 +	data1 +		
11	GND	GND (data1/3 shield)		
12	N.C.	reserved		
13	N.C.	reserved		
14	+5 V	+5 V power		
15	GND	ground		
16	HOT	hot plug det.		
17	RX0 -	data0 -		
18	RX0 +	data0 +		
19	GND	GND (data0/5 shield)		
20	N.C.	reserved		
21	N.C.	reserved		
22	GND	GND (clock shield)		
23	RXC -	clock -		
24	RXC +	clock +		
C1	N.C.	analog red		
C2	N.C.	analog green		
C3	N.C.	analog blue		
C4	N.C.	analog H-sync		
C5	N.C.	GND		

X7 - firewire

Pin	Designation	Meaning	Range	Max. cross section
1	power			
2	ground			
3	TPB-			
4	TPB+			
5	TPA-			
6	TPA+			

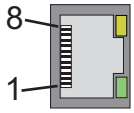
X8/9 - universal serial bus (usb)



Pin	Designation	Meaning	Range	Max. cross section
1	VBUS			

Pin	Designation	Meaning	Range	Max. cross section
2	data-			
3	data+			
4	ground			

X10 - Ethernet



Pin	Designation	Meaning	Range	Max. cross section
1	Tx+	OutputTransmitData+		
2	Tx-	OutputTransmitData-		
3	Rx+	InputReceiveData+		
4	-	(PE)		
5	-	(PE)		
6	Rx-	InputReceiveData-		
7	-	(PE)		
8	-	(PE)		

Table 7-7: Electrical connections C400/C600/P600 - X10

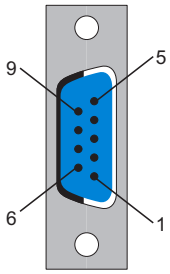
NOTE

Depending on the application, you will need different cables to connect the PacDrive controller via the RJ-45 outlet.

- Connecting PacDrive Controller <-> "Firm network" with RJ-45
  -> commercially available patch cable
- Connecting PacDrive controller <-> Hub
  -> commercially available patch cable
- Connecting PacDrive Controller <-> PC
  -> crossed RJ-45 network cable

When in doubt ask your network administrator.

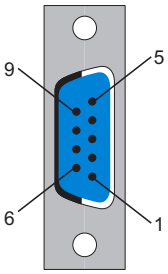
X11 - Master encoder (SinCos)



Pin	Designation	Meaning	Range	Max. cross section
1	REFSIN	Reference Signal Sinus		0.25 mm²
2	SIN	Sinus trace		0.25 mm²
3	REFCOS	Reference Signal Cosinus		0.25 mm²
4	COS	Cosinus trace		0.25 mm²
5	+9 V	Supply voltage		0.25 mm²
6	RS485-	Parameter channel -		0.25 mm²
7	RS485+	Parameter channel +		0.25 mm²
8	SC_SEL	Master encoder plugged in (bridge to GND)		0.25 mm²
9	GND	Supply voltage		0.25 mm²

Table 7-8: Electrical connections C400/C600/P600 - X11

X11 - Master encoder (incremental)



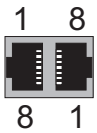
Pin	Designation	Meaning	Range	Max. cross section
1	_UA	track A		0.25 mm²
2	UA	track A		0.25 mm²
3	_UB	track B		0.25 mm²
4	UB	track B		0.25 mm²
5	+5 V	Supply voltage		0.25 mm²
6	_UO	track O		0.25 mm²
7	UO	track O		0.25 mm²
8	-	-		0.25 mm²
9	GND	ground		0.25 mm²

Table 7-9: Electrical connections C400/C600/P600 - X11

⚠ CAUTION

Plugging in/unplugging the master encoder plug when switched on!
Damage to master encoder possible!
- Only unplug or plug in master encoder when de-energized (Disconnect controller from the 24 V supply voltage!).

X12/13 - PacNet



Pin	Designation	Meaning	Range	Max. cross section
1	TxD+	OutputTransmitData+		
2	TxD-	OutputTransmitData-		
3	RxD+	InputReceiveData+		
4	TxC-	OutputTransmitClock-		
5	TXC+	OutputTransmitClock+		
6	RxD-	InputReceiveData-		
7	RxC+	InputReceiveClock+		
8	RxC-	InputReceiveClock-		

Table 7-10: Electrical connections C400/C600/P600 - X12, X13

NOTE

Use only approved PacNet cables at the PacNet connection to avoid malfunction.

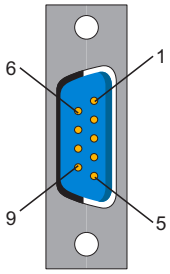
X16 - keyboard

Pin	Designation	Meaning	Range	Max. cross section
1	DATA KB	data keyboard		
2	DATA MS	data mouse		
3	GND KB	ground		
4	VCC KB	power +5 V		
5	CLK KB	clock keyboard		

Pin	Designation	Meaning	Range	Max. cross section
6	CLK MS	clock mouse		

Table 7-11: Electrical connections P600 - X16

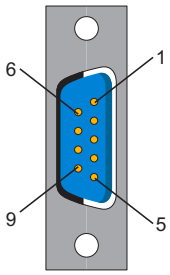
X17 - Com 1 (RS 232)



Pin	Designation	Meaning	Range	Max. cross section
1	DCD	Data Carrier Detect		0.25 mm²
2	RxD	Receive Data		0.25 mm²
3	TxD	Transmit Data		0.25 mm²
4	DTR	Data Terminal Ready		0.25 mm²
5	GND	Signal Ground		0.25 mm²
6	DSR	Data Set Ready Clear To Send		0.25 mm²
7	RTS	Request To Send		0.25 mm²
8	CTS	Clear To Send		0.25 mm²
9	RI	Ring Indicator		0.25 mm²

Table 7-12: Electrical connections C400/C600/P600 - X17

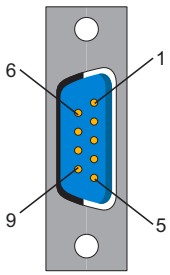
X18 - Com 2 (RS485)



Pin	Designation	Meaning	Range	Max. cross section
1	+5 VM	Supply voltage		0.25 mm²
2	TxD-	RS485 Transmit -		0.25 mm²
3	TxD+	RS485 Transmit+		0.25 mm²
4	RxD+	RS485 Receive +		0.25 mm²
5	RxD-	RS485 Receive -		0.25 mm²
6	GNDR	GND receive RS485		0.25 mm²
7	-	reserved		0.25 mm²
8	GNDM	Supply voltage		0.25 mm²
9	GNDR	GND receive RS485		0.25 mm²

Table 7-13: Electrical connections C400/C600/P600 - X18

X19 - CAN



Pin	Designation	Meaning	Range	Max. cross section
1	-	reserved		0.25 mm²
2	CAN_L	bus line (low)		0.25 mm²
3	GND	ground		0.25 mm²
4	-	reserved		0.25 mm²
5	-	reserved		0.25 mm²
6	-	reserved		0.25 mm²
7	CAN_H	bus line (high)		0.25 mm²
8	-	reserved		0.25 mm²
9	EXVCC	ext. supply trans.		0.25 mm²

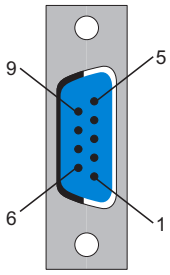
Table 7-14: Electrical connections C400/C600/P600 - X19

NOTE

An adapter is required to connect to DeviceNet, see order numbers.

An adapter is required to connect to DeviceNet, see order numbers in accessories.

X20 - profibus db



Pin	Designation	Meaning	Range	Max. cross section
1	PE	Shielding		0.25 mm²
2	-	reserved		0.25 mm²
3	RxD / TxD -P	Data -P		0.25 mm²
4	CNTR-P	Control signal P		0.25 mm²
5	DGND	Signal ground		0.25 mm²
6	VP	Supply voltage		0.25 mm²
7	-	reserved		0.25 mm²
8	RxD / TxD -N	data N		0.25 mm²
9		reserved		0.25 mm²

Table 7-15: Electrical connections C400/C600/P600 - X20

Connector

A PROFIBUS connector must be used to connect to the 9 pole PROFIBUS outlet because the bus terminal resistors are in this connector.
The possible PROFIBUS connectors with different cable outlets are illustrated below.

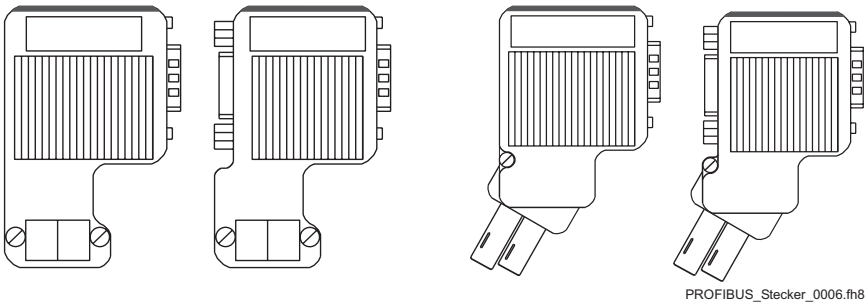


Figure 7-3: PROFIBUS connector

Bus terminal resistors

For the first and last bus nodes, the terminal resistors must be switched on. Otherwise data transmission will not function properly.
The shielding must be applied generously and on both sides.

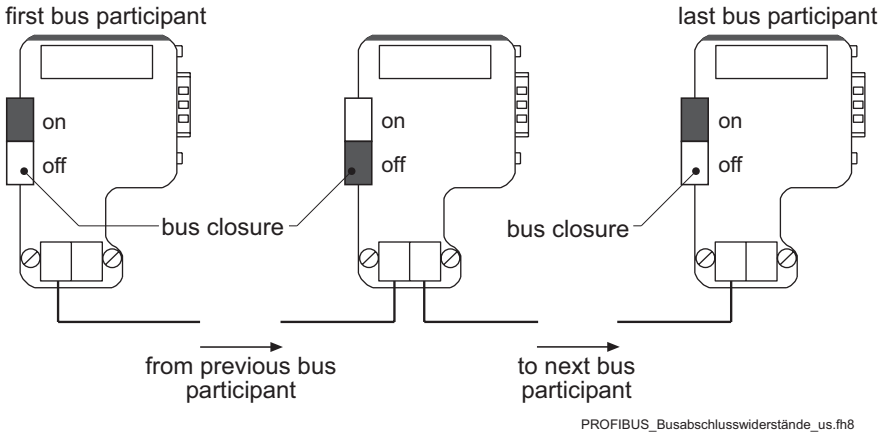


Figure 7-4: Position of the bus terminal resistors

7.4 Dimensions

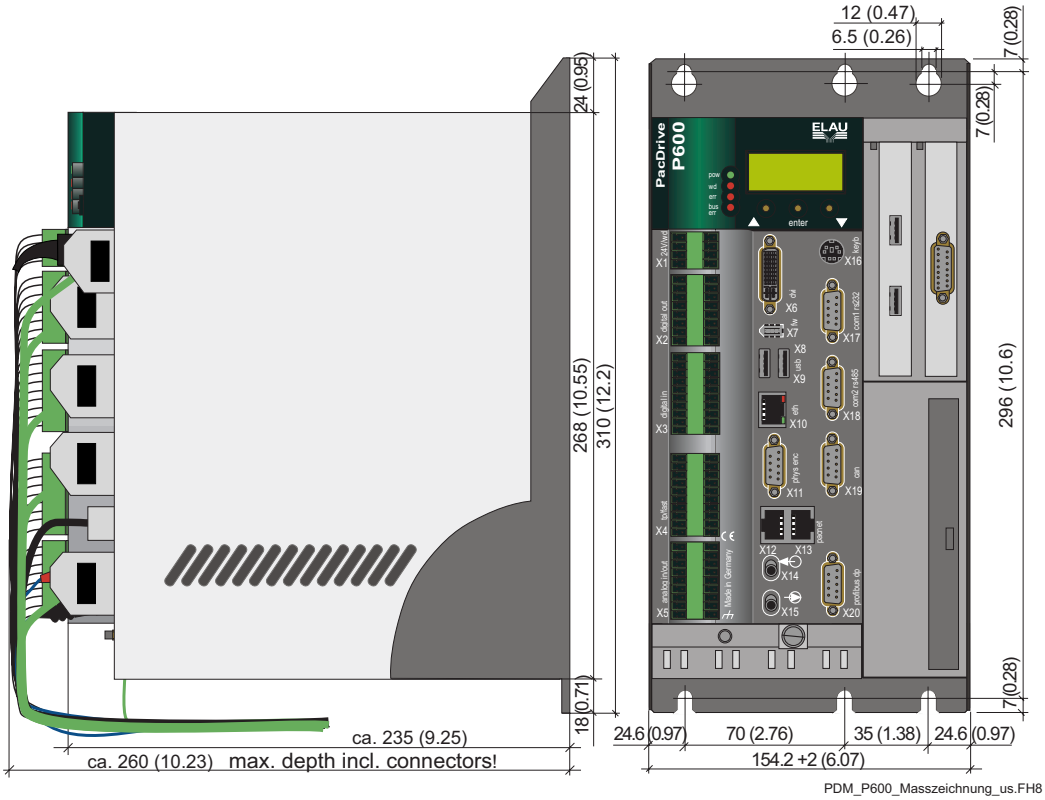


Figure 7-5: Dimensions of PacDrive controller P600

8 Diagnosis

8.1 Diagnosis Classes

Different diagnosis classes are prioritized according to the consequences they have for the entire system. At startup, a specific diagnosis code is assigned to each diagnosis class. An assignment can be DiagConfigSet() overwritten with the user program (DiagConfigSet() function).

Diagnosis class	Name	Priority
1	Fatal error	High
2	Error resulting in complete shutdown	
3	Error resulting in single shutdown	
4	Error resulting in complete stop	
5	Error resulting in single stop (if error is triggered by an axis)	
6	Warning	
7	Message	Low
8	Logger entry	None

Table 8-1: Diagnosis Classes and Reactions / Priority

The following restrictions apply when overwriting an assignment:

- Certain internal diagnosis codes (servo amplifier with Reaction (see 8.2 Reactions) A, B and C) may only be assigned with classes 1, 2 and 3.
- **Reactions** (A ... E) associated with the "Group 1xx – MotorController" type of diagnosis messages (MC-4, PS-4, SCL) cannot be changed.
- Error class 8 is used by the system and may not be changed.

NOTE

The 112 "Communication error real-time bus" (see 8.5.2.13 112 Communication error real-time bus) diagnosis message is not reported in the system because when an error occurs the motor controller (MC-4, PS-4; SCL) cannot report the diagnosis code to the controller (e.g. C400) over the SERCOS bus. In this case, diagnosis code 506 "Fatal SERCOS error (MASTER)" (see 8.5.6.7 506 Fatal SERCOS error (MASTER)) is reported.

Certain system reactions are permanently assigned to each diagnosis class:

Class	1	2	3	4	5	6	7	8	9
Entry in message logger	X	X	X	X	X	X	X	X	-
Best standstill of all drives	X	X	-	-	-	-	-	-	-
Best standstill of the triggering drive	-	-	X	-	-	-	-	-	-
Error stop of all drives	-	-	-	X	-	-	-	-	-
Error stop of the triggering drive	-	-	-	-	X	-	-	-	-
Inform IEC program (DiagMsgRead() function)	X	X	X	X	X	X	X	-	-
Activate ERROR LED	X	X	X	X	X	-	-	-	-
Configurable	X	X	X	X	X	X	X	X	X
Update diagnosis parameters of PacDrive controller	X	X	X	X	X	X	-	-	-

Class	1	2	3	4	5	6	7	8	9
Update diagnosis parameters of servo drive	X	X	X	X	X	X	X	-	-

Table 8-2: Diagnosis classes and system reactions

Best standstill

If Enable (ControllerEnable and HW_Enable) is removed, then DrivePeakC is the best way to stop the drive. If used for this purpose, **DrivePeakC** can be controlled with LimCurrent .

Error stop

If ControllerStop is active, use StopDec to stop the drive.

8.2 Reactions

Errors in the servo amplifier diagnosis group have an additional reaction.

Reaction	Meaning	Diagnosis example
A	Motor immediately loses all torque; brakes engage immediately	119 "Short circuit or ground fault in output stage" (see 8.5.2.20 119 Short circuit or ground fault in output stage)
B	Best automatic standstill: Motor decelerates with maximum delay, brakes engage when n<nmin (10 revolutions/min) or StopTimeLim (default: 400 ms) is reached; drive will lose all torque when StopTimeLim + BrakeCouplingTime is reached (default: 500 ms)	112 "Communication error real-time bus" (see 8.5.2.13 112 Communication error real-time bus)
C	Motor decelerates with max. delay yet remains under control, brakes do not engage	124 Overload (see 8.5.2.25 124 Power-Off due to overload)
D	Warning message to PacDrive controller; program can be used for controlled, synchronous standstill; if no reaction occurs, then a state class 1 error may result	125 "I2t motor warning" (see 8.5.2.26 125 "I^2t motor warning)
E	Message	133 "Speed-dependent power reduction" (see 8.5.2.34 133 Speed-dependent power reduction)

See also: Servo amplifier time diagram

8.3 "bus err" LED

The "bus err" – LED (SERCOS) onPacDrive components allows fast and easy detection when a fiberoptic cable is interrupted or the intensity setting for a transmitter in the SERCOS loop is incorrect. The LED turns off when error-free telegrams are received. After booting the master starts to send telegrams continuously. At this point, all "bus err" LEDs of the SERCOS slave (PacDrive Controller, Servo amplifier, and others) must be OFF.

NOTE

The status of the "bus err" LED is undefined during the boot procedure. The "err" – LED indicates when the boot procedure is complete. The "err" – LED switches on when the BIOS starts and switches off when the operating system, user configuration, user parameters and the IEC program are loaded and the IEC program starts. The boot procedure is now complete.

Operating principle

- When the fiberoptic ring is closed and the light output at the receiver is optimal, the LED is off.
- If the light output at the receiver is too high or too low (high damping), the LED will glow dimly.
- The further away the light output moves from the optimal reception point (i.e. too much or too little light output), the brighter the LED glows.
- The LED will glow at its brightest if the fiberoptic ring is interrupted.

Flickering or steady light indicates a problem with the SERCOS input of the device.

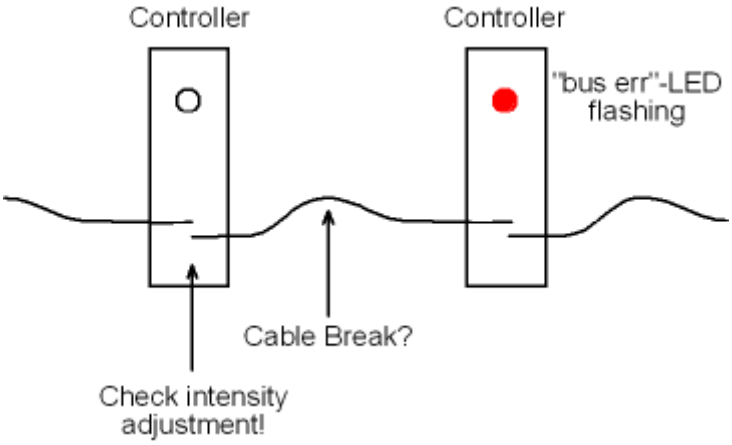


Figure 8-1: "bus err" LED flashes

err LED of the PacDrive controller (SERCOS Master; Max-4, C200, C400, C600, P600))

Other problems in the ring can be detected via the "err" LED.

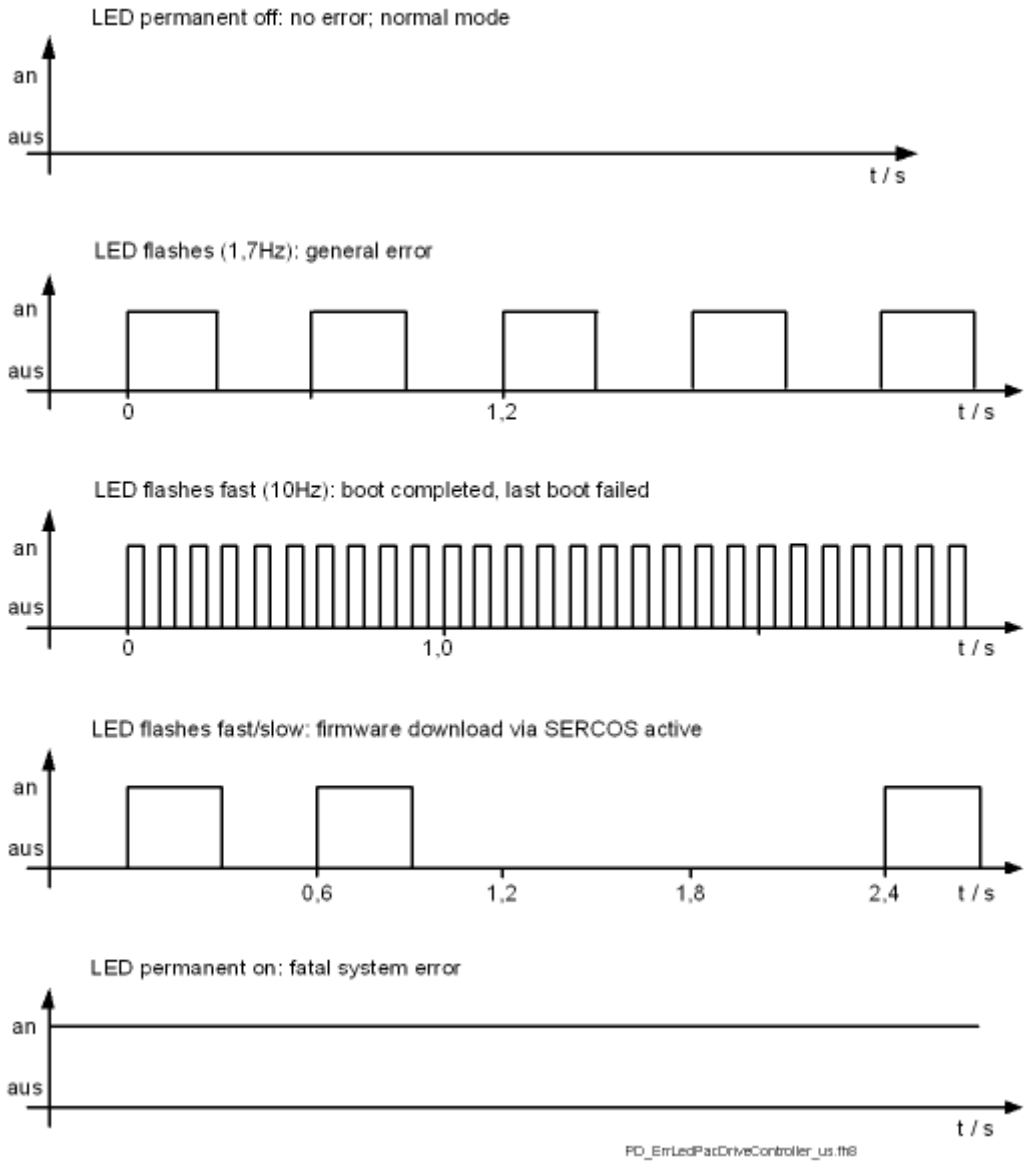


Figure 8-2: Display status of the "err" diagnosis LED of the PacDrive controller

err LED of the slave devices (e.g. MC-4, PS-4, SCL)

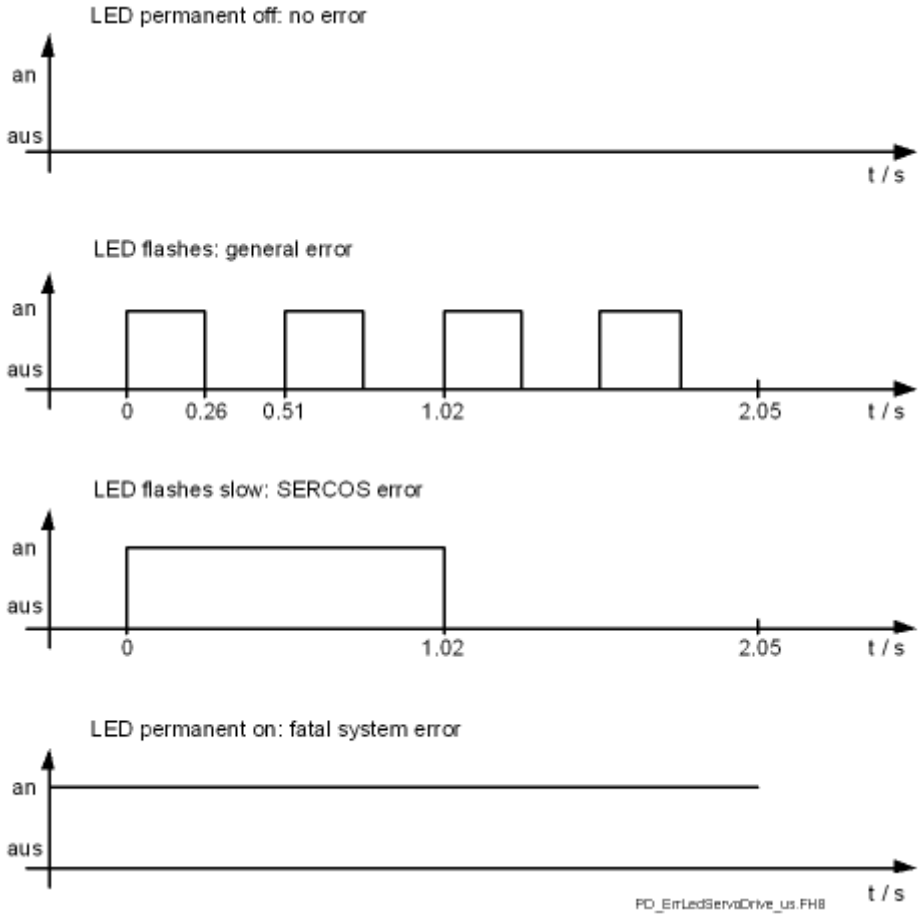


Figure 8-3: Display status of the "err" diagnosis LED of the SERCOS slave devices (e.g. MC-4)

Typical Errors

On 1 device the err LED is constantly on

On 1 device the err LED is constantly off

8.4 Acknowledging diagnosis messages

There are two possibilities when acknowledging the diagnostic messages:

- EPAS-4 > Online > Reset diagnostic message
- Function DiagQuit()

⚠ CAUTION

Position loss due to serious SERCOS bus error!
Property damage possible!
Due to the erroneous acknowledgement of diagnostic message 506 "Serious SERCOS error (MASTER)", without restarting the controller, loss of position of the axes and physical encoder (SinCos, incremental encoder) from V00.15.00 is possible.

- Only acknowledge diagnostic message if the re-initialization or referencing of the system by the IEC program has been ensured.
- The capability to acknowledge the diagnostic message can be switched off with the function DiagNoQuitSet().
- Potentially use functions SysReset() or PrgResetAndStart().

Please note that acknowledging a diagnostic message does not eliminate the cause of the error. Acknowledgement serves to confirm that I have "seen" the message. By acknowledging, the diagnostic message in the PacDrive system will be deleted. If the cause for the diagnostic message continues to exist, this diagnostic message will be recognized in the PacDrive system again.

Nr.	Zeitmarke	Typ	Objekt	Instanz	Diag. Code	Ext. Diagnose	Meldungstext
17	Mi 08.Dez 2004 08:00:51.923	0x0002	MC_4	Servo1	1118		Fehler auf ser. Schnittstelle zum Geber
16	Mi 08.Dez 2004 08:00:51.923	0x0002	MC_4	Servo1	1105		Feedbackfehler (Spurüberwachung)
15	Mi 08.Dez 2004 08:00:51.897	0x0002	LZS	LZS	8001	Error Quit	Diagnosequittung
14	Mi 08.Dez 2004 08:00:37.032	0x0002	MC_4	Servo1	1118		Fehler auf ser. Schnittstelle zum Geber
13	Mi 08.Dez 2004 08:00:37.032	0x0002	MC_4	Servo1	1105		Feedbackfehler (Spurüberwachung)

Figure 8-4: Message logger example for diagnostic messages produced again following acknowledgement

With the following errors it is also necessary to reset the triggering device for reasons of safety or due to the far reaching consequences of the error. This occurs with the reset button on the device or by switching the device's control voltage off and on again.

- 105 "Feedback error (track monitoring)"
- 107 "over-current"
- 113 "braking resistor defective"
- 114 "Reading error EEPROM"
- 115 "Gate-power failure"
- 117 "Reading error encoder EEPROM"
- 118 "Error in servo interface with encoder"
- 119 "Short or ground circuit in output stage"
- 138 "Prohibited motor"
- 144 "DC bus short circuit"
- 145 "DC bus ground circuit"
- 148 "Internal voltage error 15V"
- 160 "Under voltage power stage driver"
- 202 "Faulty configuration file"
- 203 "Faulty parameter file"
- 207 "Hardware module does not exist"
- 209 "Last boot failed"
- 300 "Division error" up to 312 "Parameter relocation failed"
- 700 "CAN Layer2 driver error"
- 701 "CAN Layer2 init error"
- 721 "Module not ready"
- 723 "No Profibus config data"
- 730 "Bad master parameter data"
- 731 "Automatic bus deactivation"
- 737 "Double IEC address assigned"
- 738 "Config. IO data > permitted IO range"

- 739 "Double profibus address assigned"
- 752 "No CanOpen EDS file exists"
- 753 "Initialization CanOpen module failed"
- 826 "Error during PIC FW update"
- 900 "Software error (suspend task)"
- 901 "Software error (invalid opcode)"
- 902 "Software error (page fault)"
- 904 "Software error (class 1)"

8.5 Diagnostic messages

8.5.1 0xx "Messages" diagnosis messages

001 Diagnosis acknowledgement

A diagnosis message was acknowledged.

The "001 diagnosis avcknowledgement" message is always entered in the message logger even if the diagnosis class (see 8.1 Diagnosis Classes) of the message was set to 9 using the DiagConfigSet() function.

002 PacController boot started

The PacDrive controller was restarted.

In V00.15.00 or higher, the firmware version is shown in the ext. diagnosis in the message logger (e.g. FW V00.15.00).

003 PacController boot finished

The startup procedure for the PacDrive controller is complete.

In V00.15.00 or higher, the kernel version is shown in the ext. diagnosis in the message logger (e.g. V00.02.05 MAx4).

004 IEC program started

The IEC program in the PacDrive controller was restarted.

005 automatic program start active

The autom. program start of the IEC program is active in the PacDrive controller.

006 IEC program stopped

The IEC program in the PacDrive controller was stopped.

007 login

A login to the PacDrive controller was performed. The application that performed the login (e.g. EPAS-4) is shown in the extended diagnosis.

008 logout

A logout from the PacDrive controller was performed. The application that performed the logout (e.g. EPAS-4) is displayed in the extended diagnosis.

009 IEC program reset

A program reset was triggered with EPAS-4.

010 write file

File transfer via communication server. The file name is displayed in DiagExtCode.

011 connect to WEBS

Connecting to webserver.

012 disconnect from WEBS

Disconnecting from webserver.

013 connect to TCP/IP server

Connecting to communication server of PacDrive controller.

014 disconnect from TCP/IP server

Disconnecting from communication server of PacDrive controller.

015 filesystem <ide0:> repaired

Error in filesystem detected and corrected.

NOTE

The filesystem is consistent again. This may also mean that files have been deleted.

016 system reset

Warmstart

017 CanOpen emergency message reset

A CANopen node has sent a CanOpen emergency message reset (see 8.5.8.30 754 CanOpen emergency message) to the bus.

Meaning of ext. diagnosis:
shows the node address, the error code and the error register.

Structure: Nxxx Cxxxx Rxx

N node address decimal CANopen node address

C error code hexadecimal CANopen error code..

R error register hexadecimal CANopen error register.

018 CanOpen node guarding error resolved

A CANopen node has sent a CANopen emergency message reset to the bus.
A CANopen node has reported the disappearance of a monitoring error

Meaning of ext. diagnosis:
shows the node address, the error code and the error register.

Structure: Nxxx Cxxxx Rxx

N node address decimal CANopen node address

C error code hexadecimal CANopen error code..

R error register hexadecimal CANopen error register.

019 CanOpen node-specific error info

A CANopen node has sent an emergency message to the bus. This diagnosis message is always sent with the 754 "CanOpen emergency message" (see 8.5.8.30 754 CanOpen emergency message) diagnosis message. It contains manufacturer-specific error data. This data consists of 5 byte values.

Meaning of ext. diagnosis:

Structure: b1 b2 b3 b4 b5

b1-b5 hexadecimal date

020 IEC cycle check changed

The CycleCheckSet() function was used to enable/disable the cycle check. TRUE or FALSE is displayed in DiagExtCode.

021 IEC cycle check values are changed

The CycleCheckSet() function was used to change the times for monitoring single (see 8.5.4.18 317 Cycle time overrun) and excessive (see 8.5.4.14 313 Excessive cycle time overrun) cycles time overruns. The times are shown in DiagExtCode .

022 Calling SetTaskPriority()

The SetTaskPriority() function was called.

023 system shutdown

SysShutdown is used via:

- IEC function: SysShutdown()
- UPS shutdown

DiagExtMsg: Windows

If Windows XP is shut down while the real-time system is running, then the message in the P600 PacDrive controller may have other causes:

- Supply voltage is 0V => UPS shuts P600 down
- The user shuts down Windows XP through the Start menu.

Until version V00.16.xx, the 016 "system reset" (see 8.5.1.16 016 system reset) diagnosis message was triggered.

024 modem connected

Successful connection through a modem.

025 modem disconnected

Disconnection via a modem.

026 user exception

The SysUserCallStack() function caused an entry in the message logger. The value the function delivers is available in "Ext. Diagnosis" in the message logger. The message logger call hierarchy function can be used to "backtrace" the function block call or nesting.

027 open write file

028 close write file

029 UPS ok

UPS monitoring reported "UPS ok" (State = 1).

030 UPS active, no power

UPS monitoring reports that no power is available (State = 3).

031 UPS power ok

UPS monitoring reports that power is available.

032 Begin saving retainarea

At shutdown, via UPS monitoring, saving retain area was started.

033 Retainarea saved

At shutdown, via UPS monitoring, saving retain area was terminated.

034 IEC-tasks terminated

At shutdown, via UPS monitoring, the IEC tasks were terminated.

035 UPS active - system shutdown started

At shutdown, via UPS monitoring, the O_OffValue output was set to UPS shutdown.

036 Rebooting started

At shutdown, via UPS monitoring, the power supply of the PacDrive controller was found to be OK. A reboot of the PacDrive controller was initiated.

037 Battery low

The battery voltage has dropped below the permissible minimum value.

- The battery voltage is too low.

- ▶ Change the battery for the PacNet optional module PN-4.

038 Power fail

- There was a voltage drop at the NvRam and at the real time clock (RTC). The NvRam is deleted and the system time is not correct.
- The system has been switched off for too long and the battery voltage is insufficient (see 8.5.1.37 037 Battery low).
- ▶ Retain range and reinitialize clock.
- ▶ Change the battery for the PacNet optional module PN-4.

- **(Ext. Diagnosis = PowerFail0-7:**
  There is no power supply to outputs 0 to 7 of bus terminal BT-4/DIO.
- ▶ Check power supply at connector X6 of bus terminal BT-4/DIO.

- **(Ext. Diagnosis = PowerFail 8-15:**
  There is no power supply to outputs 8 to 15 of bus terminal BT-4/DIO1.
- ▶ Check power supply at connector X7 of bus terminal BT-4/DIO.

039 file removed

Filter type 13 "extended system messages"

The system has deleted a file. Deletion is triggered when, for example, there is a symbol filethat does not match the program file.
The file name is shown in **Ext. Diagnosis**.

040 file copied

The system copied a file. The "Boot.sbd" symbol file is copied to "Download.sbd" when, for example, Online-Change is executed without downloading a program and the system is reset (boot procedure).

041 file renamed

The system renamed a file.

042 SERCOS phase changed

A SERCOS phase change has occurred. The new phase is displayed in the message logger in "Ext. diagnosis" (e.g. Phase=4).

DiagExtCode	Meaning
Phase=0	Phase change after Phase 0
Phase=1	Phase change after Phase 1
Phase=1/4MBd	from V00.24.00 additional indication of baud rate
Phase=1/xxx	Internal error xxx during phase change after phase 1.
Phase=2	Phase change after Phase 2
Phase=2/L=25%	from V00.22.00 additional indication of SERCOS cycle load in percent
Phase=2/xxx	Internal error xxx during phase change after phase 2.
Phase=3	Phase change after Phase 3
Phase=3/2ms	from V00.24.00 additional indication of SERCOS cycle time
Phase=3/xxx	Internal error xxx during phase change after phase 3.

DiagExtCode	Meaning
Phase=4	Phase change after phase 4
Phase=4/xxx	Internal error xxx during phase change after phase 4.
Phase=5	Phase change after phase 5
Phase=5/xxx	Internal error xxx during phase change after phase 5.

Table 8-3: Possible values for DiagExtCode for diagnostic message 042 "SERCOS phase change"

"Phase=<Phase number>/<internal error number>":

- An error has occurred during the phase change.
- ► Check the message logger for other SERCOS diagnostic messages.
- ► Note the description of these diagnostic messages.

"Phase=1/-<internal error number>":

- SCL-055 motors are connected to the PacDrive controller. The connection of the SCL-055 motors in the PacDrive PD-8 box is not correct.
- ► Check the connection of the SCL-055 motors in the PacDrive PD-8 box. It is not enough to place the jumpers on the desired terminations. No nodes to be plugged into the following SERCOS plug-in position.
- ► Observe also the information outlined in the "SCL" and "PS-4 and PD-8" operating manuals.

043 Detect SERCOS configuration

The SERCOS configuration is being detected. A scanis executed during this process.
The "ext. diagnose" in the message logger shows the following values:

- Start
  -> Configuration scanning started.
- Position
  -> The physical address of the instance in the SERCOS loop is shown (e.g. instance "SLAVE1" position=3).
- End
  -> Configuration scanning stopped.
- No slaves
  -> No SERCOS slaves found.

044 SERCOS firmware download

A firmware download is being executed from the PacDrive controller to a SERCOSbus slave.

The "ext. diagnose" in the message logger shows the following values:

- DL start -> Firmware download started
- Dl x OK -> Successful firmware download to slave x (x is the RealTimeBusAdr)

045 error by writing in file

Error occurred when writing in a file.

- Insufficient memory capacity.

► Check to see that memory capacity is sufficient (parameter RamDiskFree, Diskfree).
► Increase the RamDiskSize.
(The default size was increased from V00.16.10 from 128KB to 1MB.)

▪ An attempt was made to write a trace file onto the RAM disk ("ram0").
► Increase RamDiskSize.
(The default size was increased from V00.16.10 from 128KB to 1MB.)

046 FPGA firmware download

After programming the FPGA (C400, C600 and P600) or in the event of errors, the diagnostic message is discharged.

The various causes are displayed by different external diagnostic codes. The following is an overview of all of the external diagnostic codes, what caused them and how to eliminate them:

DiagExtCode: C6_xpxx.esv (e.g. C6_0301.esv) or C6_xpxx.xsv (e.g. C6_0301.xsv)

▪ The FPGA firmware was successfully programmed. The DiagExtCode states the name of the programmed FPGA file.
► -

DiagExtCode: PinOut <> "p" (e.g. PinOut <> 3)

▪ No C6_xpxx.xsv file with a matching pinout was found on the flash disk (C400 or C600) or hard disk. (P600). xpxx corresponds to the FPGA firmware version. The FPGA programming was not executed. The PinOut number "p" in the file name characterizes the required hardware version. I.e. a specific hardware version is required for each FPGA version.
► Contact ELAU customer service to obtain the correct FPGA version for your hardware.

047 PIC firmware download

The firmware of the PIC controller (on the PacDrive controller C400, C600 or P600) is being replaced. The extended diagnosis code shows the name of the firmware file (e.g. "c6p_0510.bin").
If an error occurs during the firmware exchange, the 826 "PCI update error" (see 8.5.9.27 826 Error During PIC FW Update) diagnosis message will be triggered.

048 BT-4/DIO1 firmware download

The firmware of the BT-4/DIO1 bus terminal is being exchanged.

In the following HW versions or higher, an automatic FW update of the connected BT-4/DIO1 bus terminal is possible with controllers C200, C400, C600 and P600:

▪ P600/C600/C400 with FPGA version x311 or higher
▪ C200 with FPGA version x209 or higher

Other requirements:

▪ Firmware file for BT-4/DIO1: "BD1_xxxx.ESV"

To execute the update, the firmware file for the BT-4/DIO1 bus terminal must be copied to the root directory of the controller. The update will be automatically executed at the next startup.

Duration of the update

Controllers C400, C600 and P600 approx. 1 minute / bus terminal
Controller C200: approx. 3,5 minutes / bus terminal

NOTE

After the update, all BT-4/DIO1 bus terminals must be switched off and on. A standard reset on the controller is sufficient.
The update will only be executed if the bus terminal has a lower firmware version.

050 No reaction from Windows

Windows did not react within the WinWatchDogtime. A control task can be used to react to this event .

051 Controller type

The PacDrive controller was restarted (rebooted). Shortly before the start procedure ends, the controller type will be saved as a diagnosis message in the message logger.

Example:
Max4/FPGA/=130f/CPU=581/AX=8/RAM=32/NRAM=32/DiskS=16

NOTE

The controller type might not be displayed in its entirety since the message text has a limited number of characters.

052 Extended SERCOS diagnosis (MASTER)

As it is very difficult to get an exact SERCOS diagnosis and localize communication errors, especially when complex errors occur in pure SCL systems, the first stage for extended diagnosis functions was implemented in V00.16.30.

This stage is not a definitive solution and may change in the next firmware version.

Operating principle

If a communication error occurs, the controller will, at specified times, record the error counter in the SERCOR memory and the pending error events (error interrupts) in the SERCOS registers.

At first, these times refer to the occurrence of the first fault as a simple cycle error. Secondly, they refer to the occurrence of a multiple cycle error, which results when simple cycle errors occur directly after each other. Finally, a recording is made directly before the controller returns to phase 0.

These recordings are displayed in the message logger. To prevent these messages from being displayed when a machine is shut down intentionally, they will be displayed with a delay of 10 seconds and then triggered at a lower priority level. If during this time the pending errors are acknowledged, the message will also be displayed without delay.

Requirements

The following requirements must be observed when using the extended SERCOS diagnosis:

- PacDrive controller – firmware version V00.16.30 or higher
- EPAS-4 as of V 16.22 or higher (PacControl CD V16 SP3)

Operation

Activation To activate the extended SERCOS diagnosis, the Bit0 of the TestSwitch1 must be set to 1 in the PLC configuration.

NOTE

The Testswitch1 may only be set in version V00.16.30 / V00.16.40 or higher. It will no longer be required in the final version. In versions above V00.16.40, expect the Testswitch to have a new purpose with different functions!

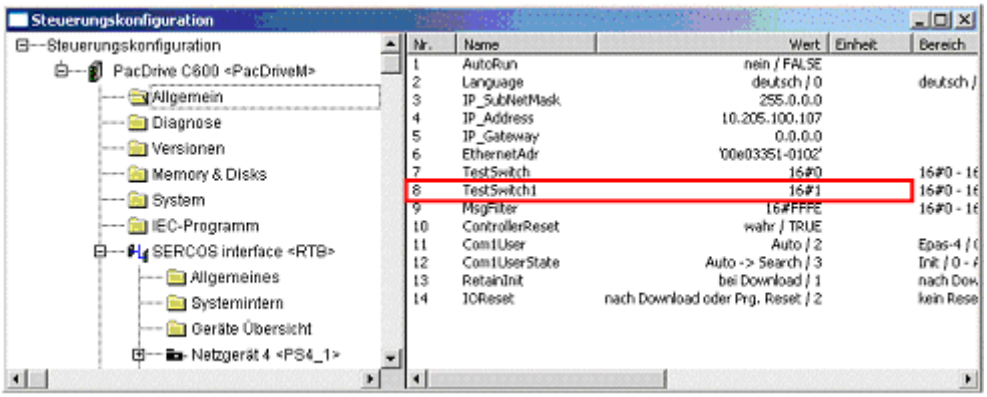
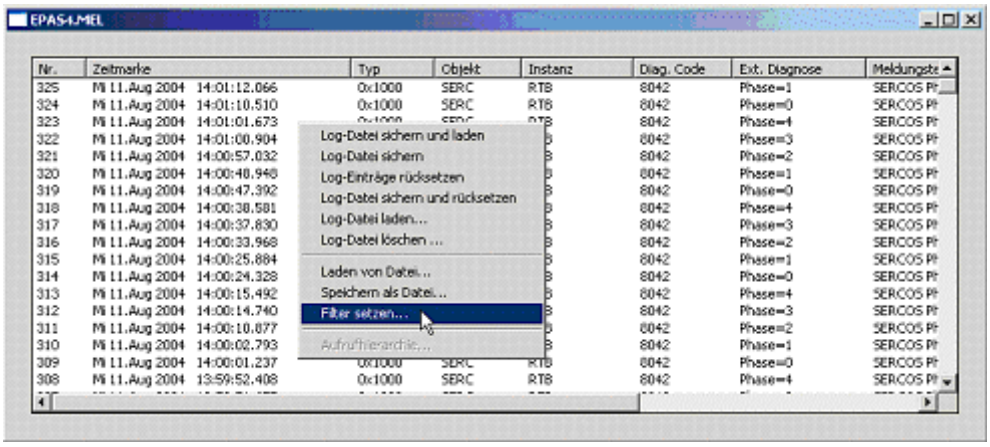


Figure 8-5: Set TestSwitch1 parameter to 1 (V00.16.30 / V00.16.40)

The display filter settings in the message logger must continue to include the 5th entry ("additional SERCOS diagnosis"):


EPAS4.MEL
Nr. Zeitmarke Typ Objekt Instanz Diag. Code Ext. Diagnose Meldungste
325 Mi 11.Aug 2004 14:01:12.066 0x1000 SERC RTB 8042 Phase=1 SERCOS Pf
324 Mi 11.Aug 2004 14:01:10.510 0x1000 SERC RTB 8042 Phase=0 SERCOS Pf
323 Mi 11.Aug 2004 14:01:01.673 8042 Phase=4 SERCOS Pf
322 Mi 11.Aug 2004 14:01:00.904 8042 Phase=3 SERCOS Pf
321 Mi 11.Aug 2004 14:00:57.032 8042 Phase=2 SERCOS Pf
320 Mi 11.Aug 2004 14:00:48.948 8042 Phase=1 SERCOS Pf
319 Mi 11.Aug 2004 14:00:47.392 8042 Phase=0 SERCOS Pf
318 Mi 11.Aug 2004 14:00:38.581 8042 Phase=4 SERCOS Pf
317 Mi 11.Aug 2004 14:00:37.830 8042 Phase=3 SERCOS Pf
316 Mi 11.Aug 2004 14:00:33.968 8042 Phase=2 SERCOS Pf
315 Mi 11.Aug 2004 14:00:25.884 8042 Phase=1 SERCOS Pf
314 Mi 11.Aug 2004 14:00:24.328 8042 Phase=0 SERCOS Pf
313 Mi 11.Aug 2004 14:00:15.492 8042 Phase=4 SERCOS Pf
312 Mi 11.Aug 2004 14:00:14.740 8042 Phase=3 SERCOS Pf
311 Mi 11.Aug 2004 14:00:10.877 8042 Phase=2 SERCOS Pf
310 Mi 11.Aug 2004 14:00:02.793 8042 Phase=1 SERCOS Pf
309 Mi 11.Aug 2004 14:00:01.237 8042 Phase=0 SERCOS Pf
308 Mi 11.Aug 2004 13:59:52.408 0x1000 SERC RTB 8042 Phase=4 SERCOS Pf
Log-Datei sichern und laden
Log-Datei sichern
Log-Einträge rücksetzen
Log-Datei sichern und rücksetzen
Log-Datei laden...
Log-Datei löschen ...
Laden von Datei...
Speichern als Datei...
Filter setzen...
Aufrufhierarchie...

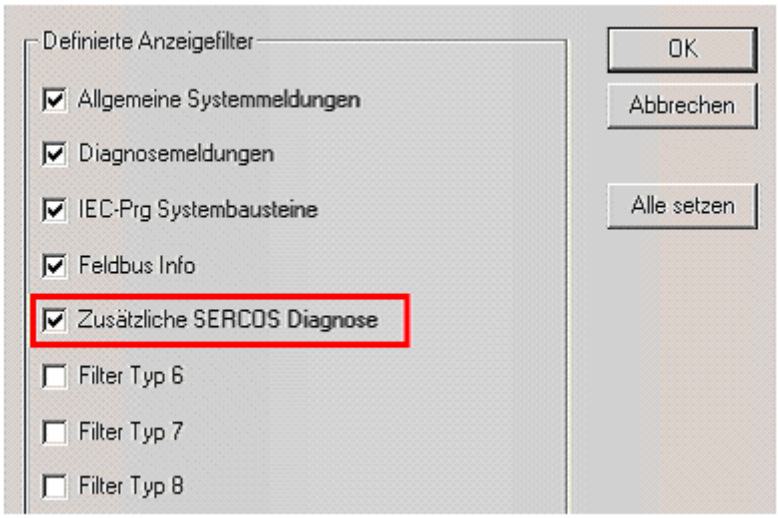


Figure 8-6: Set the filter in the message logger for "additional SERCOS diagnosis".

However, the filter settings should correspond to the basic settings in EPAS-4 V16 SP3 or higher.

General information on SERCOS communication

To better understand the outputs of the extended SERCOS diagnosis, a brief introduction of the operating principle behind SERCOR communication in the PacDrive system is provided here.

SERCOS involves cyclical communication occurring in a ring-shaped communication structure.

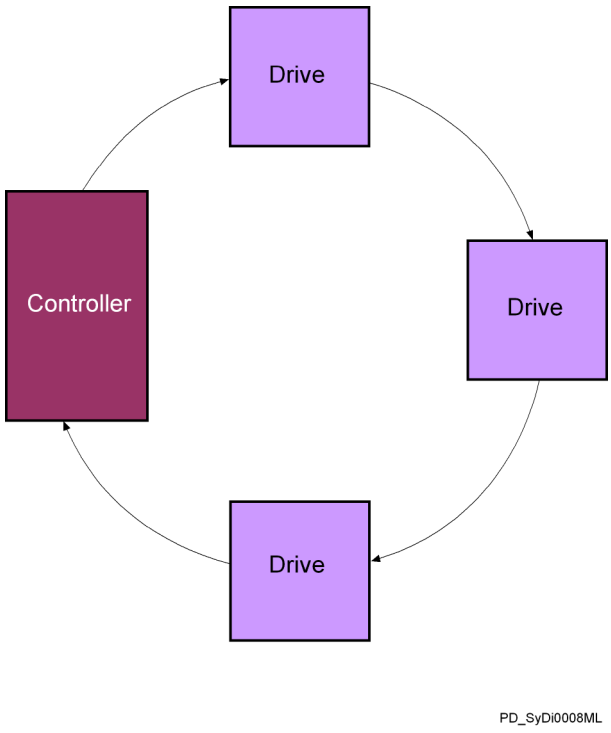


Figure 8-7: SERCOS communication / ring

All received signals are immediately forwarded by the drives in the ring. They interrupt the ring only when sending their own data telegrams. The controller does not forward data telegrams, but only evaluates them.

There are three type of telegrams in SERCOS communication:

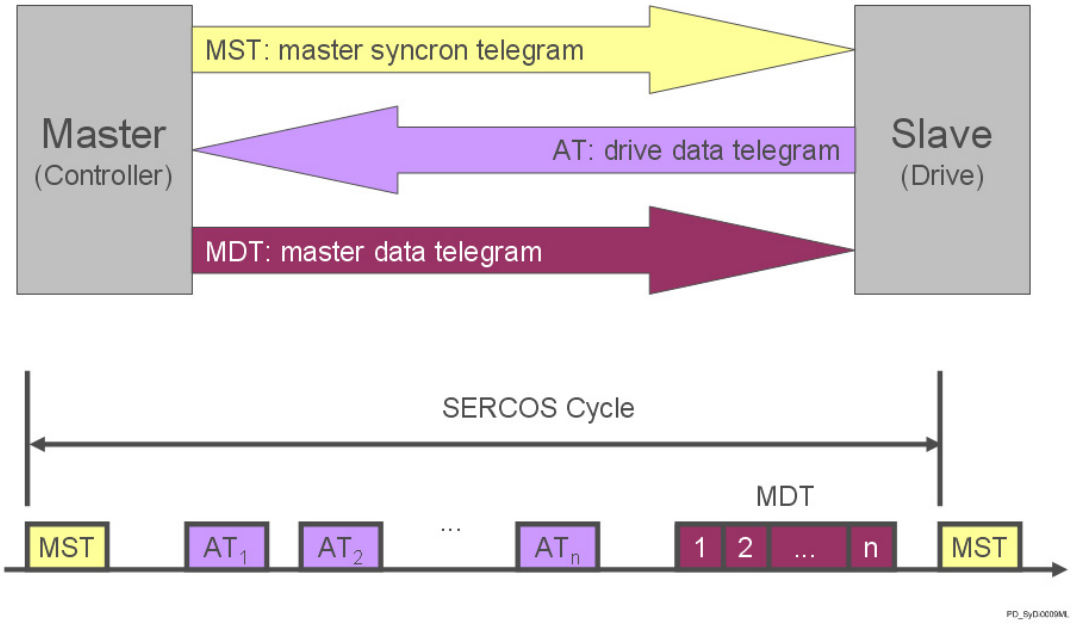


Figure 8-8: SERCOS communication / types of telegrams

The most important telegram is the synchronization telegram (MST), which is sent by the controller at the beginning of each cycle. This telegram synchronizes the individual drives and can send your telegrams at the correct time.

These telegrams are the second type of telegrams, the drive telegrams (DT). They send the current positions and status information of the drives to the controller. The times at which the DTs are sent are determined during the phase startup and are then sent to the MST.

At the end of the cycle the controller also sends its master data telegram (MDT) after the DTs. This telegram contains a range for each drive that includes its target position and controller information.

During those times in which no telegrams are transferred, the controller sends a continuous dummy signal that is forwarded by the drives.

For the controller, there are primarily three different ways to diagnose communication errors (the letters in parentheses are used by "ext. diagnose" for identification purposes):

Error in synchronization telegram:

If functioning properly, the synchronization telegram (MST) sent at the beginning of a cycle is received by the master only a little later again. As a result, the means by which this telegram is received can be controlled. This minimal delay is caused by the signal runtime in the ring.

The controller specifically checks whether the telegram arrives before ("e" – MST early) or after ("l" – MST late) the expected reception window, which results in a simple SERCOR cycle error. If an MST is not received in the appropriate time window over

two sequential cycles, an MST miss ("M" - MST miss) will be detected and displayed via a multiple SERCOS cycle error.

Receive error of drive telegrams

The controller also monitors the receipt of drive telegrams. If one of the drive telegrams is not received in a cycle or an error occurs with the CRC monitoring of the telegram, then a receive error ("r" – Receive Error) will be indicated and displayed via a simple SERCOR cycle error. If receive errors occur with multiple telegrams in a cycle, they remain a simple SERCOR cycle error.

Only after receive errors are signalled in two sequential cycles (this can also be different telegrams), will a receive miss ("R" – receive miss) be detected and a multiple SERCOR cycle error will be triggered.

Signal faults

The dummy signal that is continuously sent out by the controller also allows communication faults in the SERCOR ring to be determined apart from the telegrams. If the edges of the signal move beyond a specified window, it means that there is a receive distortion ("d" – Receive Distortion), which is displayed with a simple SERCOS cycle error. If no edges arrive within a specific time period, it means there is a fiberoptic break ("F" – Fiberoptic Break), which is displayed with a multiple SERCOS cycle error.

Unfortunately, the controller cannot detect errors during the master data telegram.

Another important point in evaluating the diagnosis information is the physical sequence in the SERCOR ring. This is in no way dependent on the telegram sequence during a communication cycle.

The telegram sequence during a cycle corresponds to the sequence of the drives in the PLC configuration under EPAS-4. However, the telegrams are grouped by drive type in the following order: PS4 – MC4 – SCL.

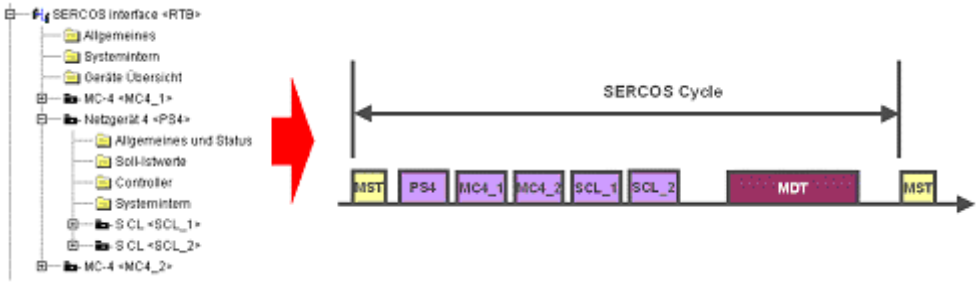


Figure 8-9: SERCOR interface / telegram sequence

The physical sequence corresponds to the sequence in which the slaves are connected to the fiberoptic ring. Note here that the physical sequence of the PS4 and connected SCL is reversed. In this case, the last connected SCL is the first slave and the PS4 is the last. The above example could appear as follows:

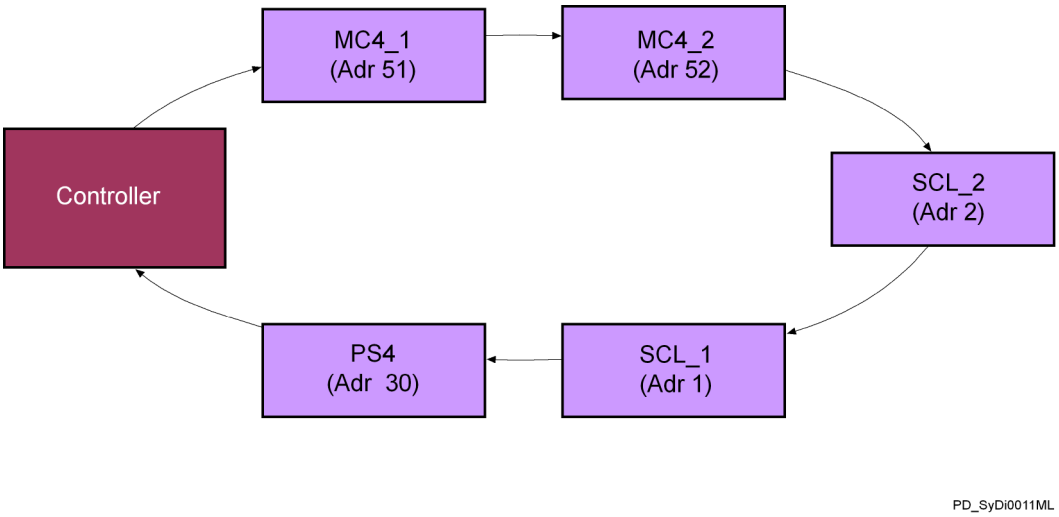


Figure 8-10: SERCOR interface / physical sequence

Any confusion concerning the physical sequence can be cleared up by using EPAS-4. The "Scan" function in the "System internals" group under the "SERCOS interface" object is available for this purpose.

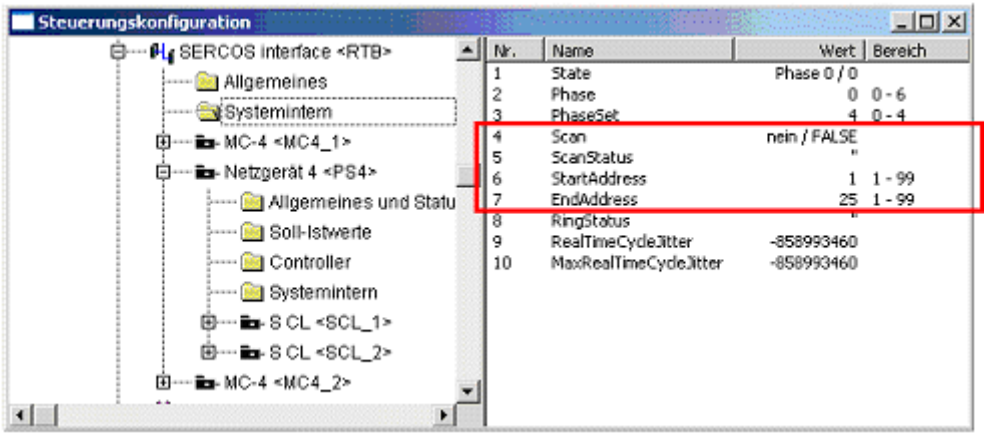
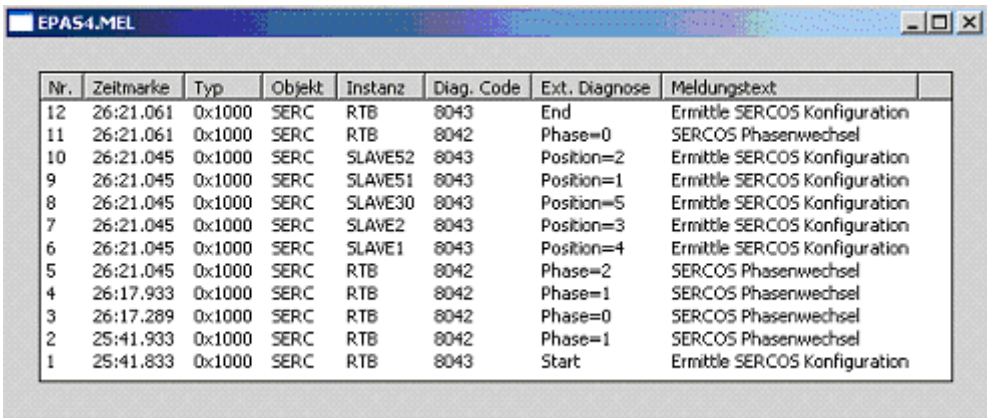


Figure 8-11: SERCOR interface / parameter for scanning the bus

To start this function, the SERCOR must be in phase 0 and no communication errors may be present. "StartAddress" and "EndAddress" can be used to specify the address range to be scanned. "ScanStatus" can be used to monitor the current status of the scan. Once the scan is complete, the "scanned" status will appear.

Now the information on the physical ring configuration is available in the message logger. The "Instance"column contains the SERCOS address of the drive (SLAVExx) while the "Ext. Diagnosis" column contains the corresponding position.

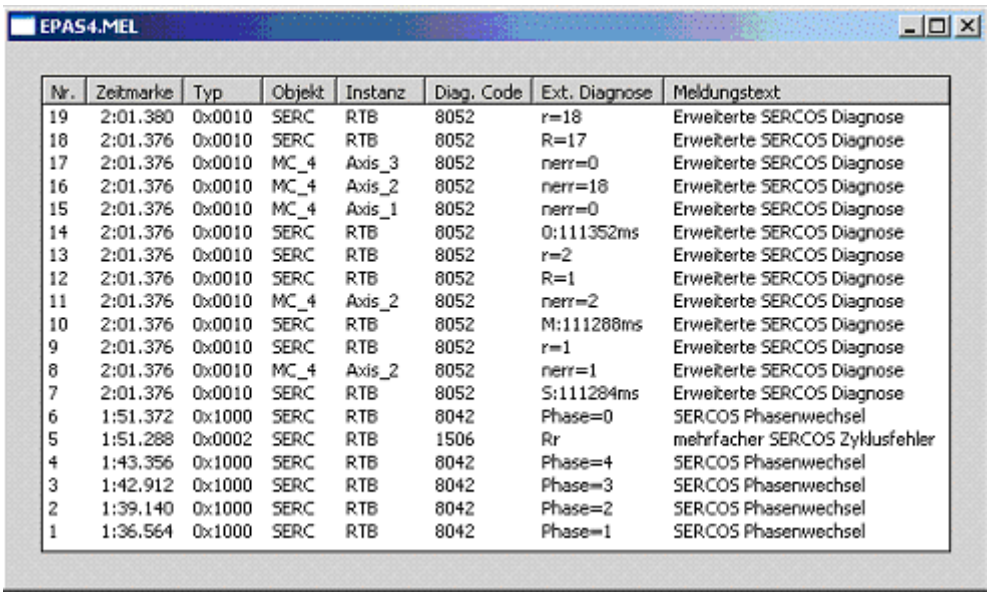


Nr.	Zeitmarke	Typ	Objekt	Instanz	Diag. Code	Ext. Diagnose	Meldungstext
12	26:21.061	0x1000	SERC	RTB	8043	End	Ermittle SERCOS Konfiguration
11	26:21.061	0x1000	SERC	RTB	8042	Phase=0	SERCOS Phasenwechsel
10	26:21.045	0x1000	SERC	SLAVE52	8043	Position=2	Ermittle SERCOS Konfiguration
9	26:21.045	0x1000	SERC	SLAVE51	8043	Position=1	Ermittle SERCOS Konfiguration
8	26:21.045	0x1000	SERC	SLAVE30	8043	Position=5	Ermittle SERCOS Konfiguration
7	26:21.045	0x1000	SERC	SLAVE2	8043	Position=3	Ermittle SERCOS Konfiguration
6	26:21.045	0x1000	SERC	SLAVE1	8043	Position=4	Ermittle SERCOS Konfiguration
5	26:21.045	0x1000	SERC	RTB	8042	Phase=2	SERCOS Phasenwechsel
4	26:17.933	0x1000	SERC	RTB	8042	Phase=1	SERCOS Phasenwechsel
3	26:17.289	0x1000	SERC	RTB	8042	Phase=0	SERCOS Phasenwechsel
2	25:41.933	0x1000	SERC	RTB	8042	Phase=1	SERCOS Phasenwechsel
1	25:41.833	0x1000	SERC	RTB	8043	Start	Ermittle SERCOS Konfiguration

Figure 8-12: SERCOS interface / result of the bus scan in the message logger

If a slave has position 0, the position could not be determined. This is only possible in drive version V00.15.00 or higher.

Evaluation After a SERCOS cycle error occurs, entries can be found in the message logger in a way similar to the figure below:



Nr.	Zeitmarke	Typ	Objekt	Instanz	Diag. Code	Ext. Diagnose	Meldungstext
19	2:01.380	0x0010	SERC	RTB	8052	r=18	Erweiterte SERCOS Diagnose
18	2:01.376	0x0010	SERC	RTB	8052	R=17	Erweiterte SERCOS Diagnose
17	2:01.376	0x0010	MC_4	Axis_3	8052	nerr=0	Erweiterte SERCOS Diagnose
16	2:01.376	0x0010	MC_4	Axis_2	8052	nerr=18	Erweiterte SERCOS Diagnose
15	2:01.376	0x0010	MC_4	Axis_1	8052	nerr=0	Erweiterte SERCOS Diagnose
14	2:01.376	0x0010	SERC	RTB	8052	0:111352ms	Erweiterte SERCOS Diagnose
13	2:01.376	0x0010	SERC	RTB	8052	r=2	Erweiterte SERCOS Diagnose
12	2:01.376	0x0010	SERC	RTB	8052	R=1	Erweiterte SERCOS Diagnose
11	2:01.376	0x0010	MC_4	Axis_2	8052	nerr=2	Erweiterte SERCOS Diagnose
10	2:01.376	0x0010	SERC	RTB	8052	M:111288ms	Erweiterte SERCOS Diagnose
9	2:01.376	0x0010	SERC	RTB	8052	r=1	Erweiterte SERCOS Diagnose
8	2:01.376	0x0010	MC_4	Axis_2	8052	nerr=1	Erweiterte SERCOS Diagnose
7	2:01.376	0x0010	SERC	RTB	8052	S:111284ms	Erweiterte SERCOS Diagnose
6	1:51.372	0x1000	SERC	RTB	8042	Phase=0	SERCOS Phasenwechsel
5	1:51.288	0x0002	SERC	RTB	1506	Rr	mehrfacher SERCOS Zyklusfehler
4	1:43.356	0x1000	SERC	RTB	8042	Phase=4	SERCOS Phasenwechsel
3	1:42.912	0x1000	SERC	RTB	8042	Phase=3	SERCOS Phasenwechsel
2	1:39.140	0x1000	SERC	RTB	8042	Phase=2	SERCOS Phasenwechsel
1	1:36.564	0x1000	SERC	RTB	8042	Phase=1	SERCOS Phasenwechsel

Figure 8-13: SERCOS interface / example of a message logger when an error occurs

The usual error message for a multiple cycle error appears at the beginning of line number 6.

After line number 6, the first block of the extended SERCOS diagnosis appears (line numbers 8-10)

An info mark ("S:111284ms") appears at the beginning of this diagnosis block (here line number 7) and allows the block to be assigned a specific error message. In this case, a distinction is made between the three diagnosis situations:

S – single SERCOS cycle error (SingleCycleError)
M – multiple SERCOS cycle error (MultiCycleError)
0 – switch to phase 0

The time mark (in ms) of when the error occurred is shown in connection with this error type.

All axes whose receive error counter (nerr) has changed since the last diagnosis acknowledgement or phase startup (line number 8) are then listed. The error counter is assigned to the axis via the "Object" and "Instance" columns.

NOTE

The value displayed in connection with "nerr=x" is only reset during phase startup. If more than one single SERCOS cycle error occurs during operation, the error counter will increase each time accordingly.

The remaining information refers to the error status (line no. 9). Each error status is reset during each phase startup and each error acknowledgement. This information always consists of a letter and a number ("r=1"). The letter indicates the error type while the number indicates the frequency of that error type.

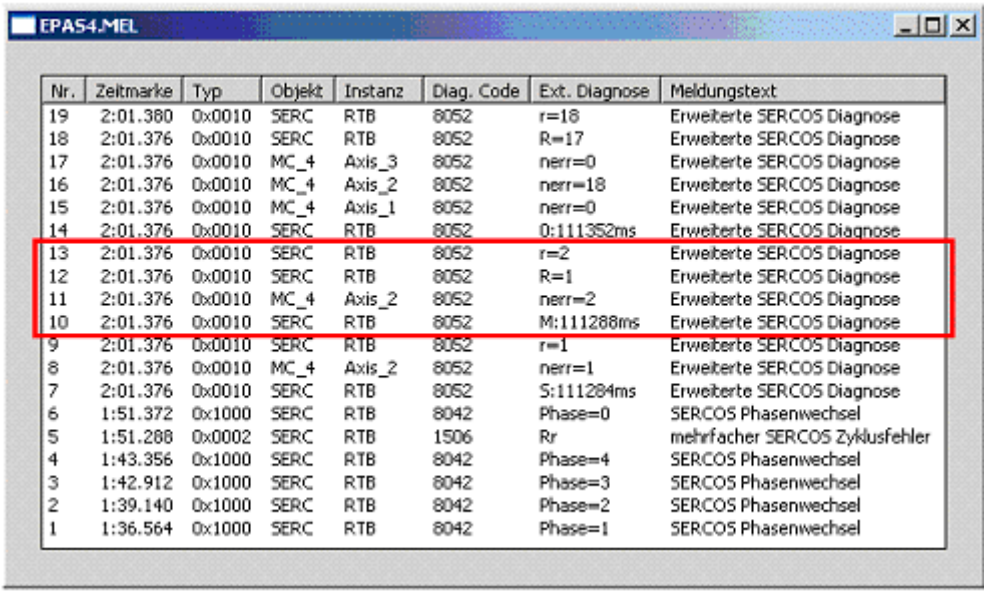
The meaning of the letter is the same as the letter in the ext. diagnosis messages for SERCOS cycle errors:

R – double miss of drive telegrams (RMISS)
R – double miss of the synchronous telegram (MSTMISS)
F – fiberoptic break (FIBBR)
1 – late reception of the synchronous telegram (MSTLATE)
e – early reception of the synchronous telegram (MSTEARLY)
d – receive distortion
r – single miss of a drive telegram (RERR)

Hence, the first diagnosis block would be interpreted as follows:

"Simple SERCOS cycle error at 111284 ms. A single telegram miss at the axis_2 drive was determined".

A second block follows the first block. In this case, the display of the multiple cycle error is involved, since the telegram from the axis_2 drive was missed a second time.



Nr.	Zeitmarke	Typ	Objekt	Instanz	Diag. Code	Ext. Diagnose	Meldungstext
19	2:01.380	0x0010	SERC	RTB	8052	r=18	Erweiterte SERCOS Diagnose
18	2:01.376	0x0010	SERC	RTB	8052	R=17	Erweiterte SERCOS Diagnose
17	2:01.376	0x0010	MC_4	Axis_3	8052	nerr=0	Erweiterte SERCOS Diagnose
16	2:01.376	0x0010	MC_4	Axis_2	8052	nerr=18	Erweiterte SERCOS Diagnose
15	2:01.376	0x0010	MC_4	Axis_1	8052	nerr=0	Erweiterte SERCOS Diagnose
14	2:01.376	0x0010	SERC	RTB	8052	0:111352ms	Erweiterte SERCOS Diagnose
13	2:01.376	0x0010	SERC	RTB	8052	r=2	Erweiterte SERCOS Diagnose
12	2:01.376	0x0010	SERC	RTB	8052	R=1	Erweiterte SERCOS Diagnose
11	2:01.376	0x0010	MC_4	Axis_2	8052	nerr=2	Erweiterte SERCOS Diagnose
10	2:01.376	0x0010	SERC	RTB	8052	M:111288ms	Erweiterte SERCOS Diagnose
9	2:01.376	0x0010	SERC	RTB	8052	r=1	Erweiterte SERCOS Diagnose
8	2:01.376	0x0010	MC_4	Axis_2	8052	nerr=1	Erweiterte SERCOS Diagnose
7	2:01.376	0x0010	SERC	RTB	8052	S:111284ms	Erweiterte SERCOS Diagnose
6	1:51.372	0x1000	SERC	RTB	8042	Phase=0	SERCOS Phasenwechsel
5	1:51.288	0x0002	SERC	RTB	1506	Rr	mehrfacher SERCOS Zyklusfehler
4	1:43.356	0x1000	SERC	RTB	8042	Phase=4	SERCOS Phasenwechsel
3	1:42.912	0x1000	SERC	RTB	8042	Phase=3	SERCOS Phasenwechsel
2	1:39.140	0x1000	SERC	RTB	8042	Phase=2	SERCOS Phasenwechsel
1	1:36.564	0x1000	SERC	RTB	8042	Phase=1	SERCOS Phasenwechsel

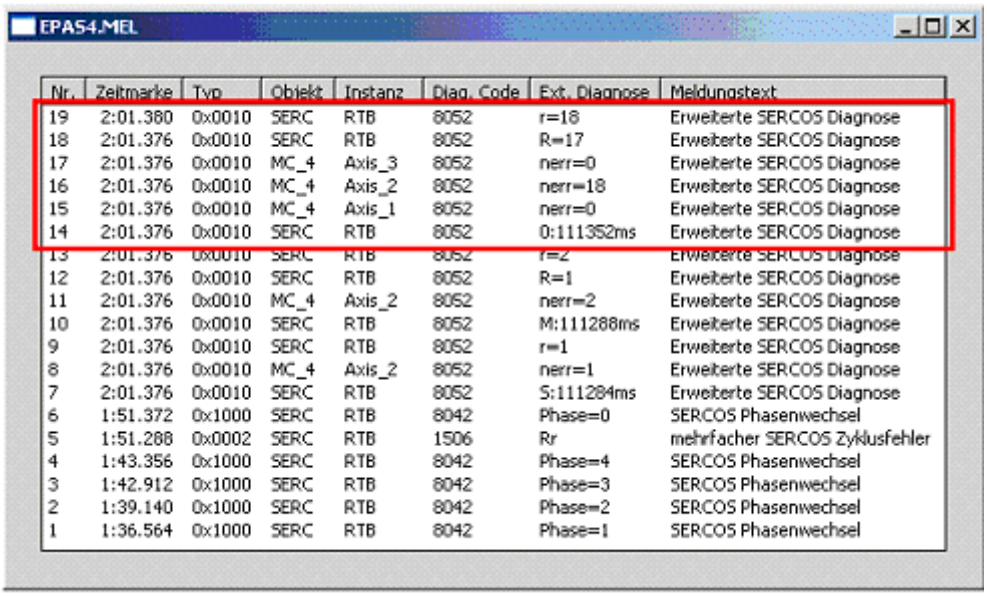
Figure 8-14: SERCOS interface / example of a message logger when an error occurs (multiple cycle error)

The multiple cycle error occurred directly in the next cycle (cycle time 4 ms) after the single cycle error and affected the axis_2 drive again. The error counter for this drive

("nerr=2") increased to 2 as did the error counter for simple cycle errors ("r=2"). The error counter for the multiple cycle error ("R=2") also increases for the first time.

The only difference between the last diagnosis block and the first two is that the error counters of all the connected drives are displayed when switching to phase 0, even for those that did not have an error ("axis_1" and "axis_3").

The time span between the multiple cycle error and the last switch to phase 0 can vary greatly and depends on a number of different factors. However, the values of 10-20 cycles are typical.



Nr.	Zeitmarke	Typ	Objekt	Instanz	Diag. Code	Ext. Diagnose	Meldungstext
19	2:01.380	0x0010	SERC	RTB	8052	r=18	Erweiterte SERCOS Diagnose
18	2:01.376	0x0010	SERC	RTB	8052	R=17	Erweiterte SERCOS Diagnose
17	2:01.376	0x0010	MC_4	Axis_3	8052	nerr=0	Erweiterte SERCOS Diagnose
16	2:01.376	0x0010	MC_4	Axis_2	8052	nerr=18	Erweiterte SERCOS Diagnose
15	2:01.376	0x0010	MC_4	Axis_1	8052	nerr=0	Erweiterte SERCOS Diagnose
14	2:01.376	0x0010	SERC	RTB	8052	0:111352ms	Erweiterte SERCOS Diagnose
13	2:01.376	0x0010	SERC	RTB	8052	r=2	Erweiterte SERCOS Diagnose
12	2:01.376	0x0010	SERC	RTB	8052	R=1	Erweiterte SERCOS Diagnose
11	2:01.376	0x0010	MC_4	Axis_2	8052	nerr=2	Erweiterte SERCOS Diagnose
10	2:01.376	0x0010	SERC	RTB	8052	M:111288ms	Erweiterte SERCOS Diagnose
9	2:01.376	0x0010	SERC	RTB	8052	r=1	Erweiterte SERCOS Diagnose
8	2:01.376	0x0010	MC_4	Axis_2	8052	nerr=1	Erweiterte SERCOS Diagnose
7	2:01.376	0x0010	SERC	RTB	8052	S:111284ms	Erweiterte SERCOS Diagnose
6	1:51.372	0x1000	SERC	RTB	8042	Phase=0	SERCOS Phasenwechsel
5	1:51.288	0x0002	SERC	RTB	1506	Rr	mehrfacher SERCOS Zyklusfehler
4	1:43.356	0x1000	SERC	RTB	8042	Phase=4	SERCOS Phasenwechsel
3	1:42.912	0x1000	SERC	RTB	8042	Phase=3	SERCOS Phasenwechsel
2	1:39.140	0x1000	SERC	RTB	8042	Phase=2	SERCOS Phasenwechsel
1	1:36.564	0x1000	SERC	RTB	8042	Phase=1	SERCOS Phasenwechsel

Figure 8-15: SERCOS interface / example of a message logger when an error occurs (switch to phase 0)

053 UPS active, overtemperature

Diagnosis class (Default): 8
Diagnosis message removed in V00.22.00 or higher (see 339 "UPS active - system temperature too high" (see 8.5.4.40 339 UPS active - system temperature too high))

The system has detected a temperature that is too high and will change the state to "System Shutdown/4" after 70 seconds.

See also:

- UPS.State parameter

054 Temperature Warning

Diagnostic class (standard): 6

The temperature in the device (C400, C600 and P600) is not within the specified range. If the temperature falls any further, the controller may shut itself off.

DiagExtCode: Temp<5°C

The temperature in the device is lower than approx. 5°C.
The following message text appears on the display:
1st line: temperature warning
3rd line: Temp < 5°C

This message can be acknowledged.
The warning is only issued from PIC version (software version) 0512 or later.

- The ambient temperature is dropping rapidly. The switch cabinet door may be open.
- ► Check ambient temperature.

- The device will be switched on and the ambient temperature is too low.
- ► Check ambient temperature.

055 Hardware Monitoring Debug Message

Diagnosis class (standard): 8

MsgFilter: Bit 14 "Filter Type 15"

See also:

- Diagnosis message 056 "Shutdown due to supply voltage outage"
- Diagnosis message 827 "Power-Off due to hardware monitoring"

DiagMsg:

-> specific error message for debugging purposes
Structure: <last error entry> : <error group> : <cause of error>

Error groups:
- VoltageError
- TempError
- EnvError

Cause of error (VoltageError):
- V3.3 < Vmin
- V5 < Vmin
- V+12 < Vmin
- V-12 < Vmin
- Vin < Vshutd
- VAccu < Vshutd
- Vin_jit < Vshutd
- capacitance
- LTC error
- Vin > Vmax
- VAccu > Vmax
- V3.3 > Vmax
- V5 > Vmax
- V+12 > Vmax
- V-12 > Vmax
- VcpuCore<Vmin
- VcpuIO < Vmin
- VM2.5 < Vmin
- VM3.3 < Vmin
- VM5 < Vmin
- VM+12 < Vmin
- VM-12 < Vmin
- VcpuCore>Vmax
- VcpuIO > Vmax
- VM2.5 > Vmax
- VM3.3 > Vmax
- VM5 > Vmax

- VM+12 > Vmax
- VM-12 > Vmax

Cause of error (TempError):
- Vin < Vmin
- VAccu < Vmin
- TAccu < Tmin
- TLM75 < Tmin
- TCPU < Tmin
- TM1 < Tmin
- TM2 < Tmin
- TAccu > Tshutd
- TLM75 > Tshutd
- TCPU > Tshutd
- TM1 > Tshutd
- TM2 > Tshutd
- TAccu > Tmax
- TLM75 > Tmax
- TCPU > Tmax
- TM1 > Tmax
- TM2 > Tmax
- I2C bus failed
- LM75 failed

Cause of error (EnvError):
- fan1stop-shutd
- fan1stop-off
- fan2stop-shutd
- fan2stop-off
- fan3stop-shutd
- fan3stop-off

Example of message text: -1 : TempError : TLM75 > Tshutd

-> The error was in the last error entry created. It is a temperature error in which the LM75 sensor detected a temperature that is too high. The shutdown limit was exceeded, and so the system shut down after the timer ran out.

056 Shutdown due to supply voltage outage

Diagnosis class (standard): 8

MsgFilter: Bit 1 "Diagnosis Messages"

The hardware provides an internal error logger that logs all the causes for error-dependent controller deactivations. The next time the controller is started up the error logger is analyzed and the cause of the error can be output in the message logger. If the reason for the shutdown was a supply voltage outage, message 056 "Shutdown due to supply voltage outage" is output.

In addition, a more specific message is output (055 "Hardware monitoring debug message") that can be enabled by the MsgFilter parameter through the EPAS-4 message logger. This message is intended to be a debug message and outputs the exact cause of the deactivation.

057 Online-change

Filter type 13 "extended system messages"

An online change was performed.

058 Controller synchronization

aV00.22.00 or higher

General status information on controller synchronization (Encoder Network)

Ext. diagnosis	Meaning
Conf slave	The synchronization slave is configured by the synchronization master .
Start Sync	The synchronization process started.
Sync OK	The **synchronization slaves** are not synchronized with the **synchronization master**.
Data Ready	Sync. encoder inputs are configured by the sync. encoder output and ready to exchange data.
Data Enable	**Sync. encoder outputs** distribute encoder data to the **sync. encoder inputs**.

059 UPS active - IEC-control task running

060 control task active on changing state

Filter type 13 "extended system messages"

The control task can react to certain events in a fast task. The UPS uses this tool to delay the shutdown of the **PacDrive controller** and thus enables the execution of application-specific activities before the system shuts down.

When changing UPS state machine in the following cases, an event is triggered that starts the **control task**:

- UPS.State = 3 – UPS active – no power
- UPS.State = 4 – UPS active – system shutdown started
- UPS.State = 6 – UPS active – system temperature too high

The **060 control task active on changing state** diagnosis message is displayed if a **control task** that has been started by UPS is still active on the following UPS state changes:

- UPS.State=3 -> UPS.State=4
- UPS.State=3 -> UPS.State=6
- UPS.State=6 -> UPS.State=4

8.5.2 1xx "Drives" diagnosis messages

100 I2T Motor

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): B

The motor is overloaded or the power supplied to the motor is too high. The integrator (I2t parameter) has increased to 100%. The motor I2t monitoring is performed with the help of an integrator that is derived from the following equations.

$ü=I_{current}/I_{NM}$

Delta $t_{at}=45s/(ü^2-1)$

Delta t_{from}=45s/(1-ü²)

$I_{current}$ = current power
I_{NM} = motor power (in V00.11.00 or higher, the I_{0M} / I_{NM} characteristic curve is incorporated).
t_{at} = build up time
t_{from} = dissipation time

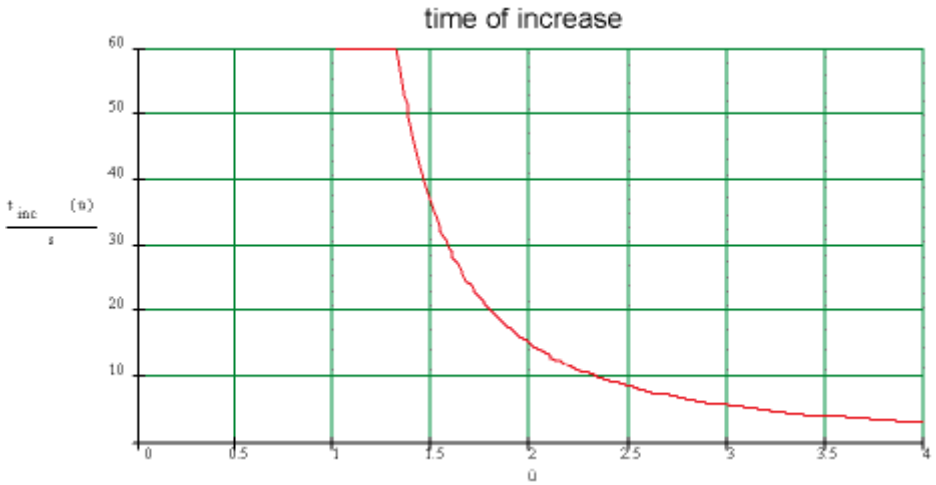


Figure 8-16: I2T motor / build up time diagnosis message

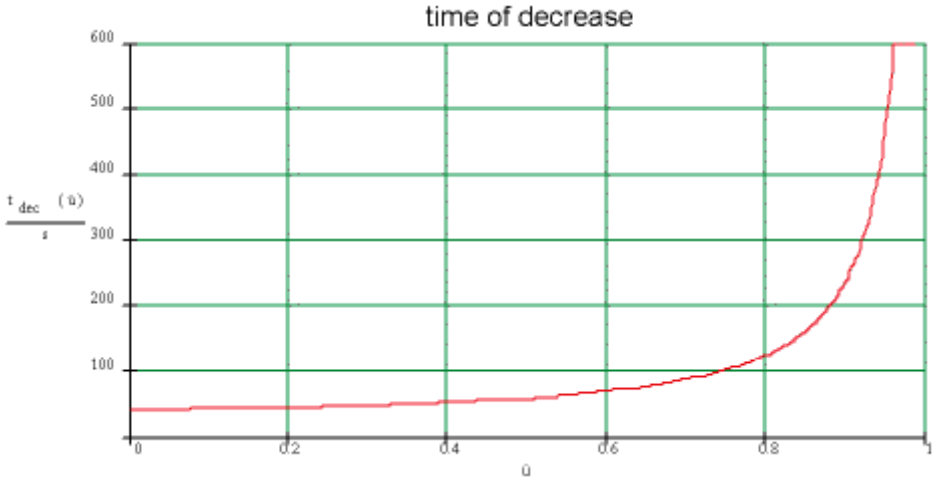


Figure 8-17: I2T motor / dissipation time diagnosis message

- The holding brake is not released (cable break, power outside the 24 V +/- 10% range).
- ▸ Check the brake or wiring.

- The lubrication system is defective.
- ▸ Check lubrication.

- Blunt tool.
- ▸ Check/replace the tool.

- The motor is vibrating.

► Check the controller parameters.

▪ The suspended axis is too heavy / the weight distribution is incorrect.
► Check drive sizing and weight distribution.
► Drive/accelerate the system at a slower speed.

▪ The motor is de-magnetized.
► Replace the motor.

101 Amplifier – power off due to overtemperature

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): B

The PacDrive servo amplifier cooling element is too hot.

▪ Ventilation is insufficient or ambient temperature is too high.
► Check device fans and ventilation openings (if available).
► Check ventilation in switch cabinet.
► Check function of air conditioner (if available).

▪ The final stage or the power rectifier is overloaded.
► Check combination motor / actuator.
► Check calculation of motor and actuator.

▪ Hardware error: The temperature sensor is defective.
► Replace device.

102 Motor - PowerOff due to overtemperature

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): B

The internal motor temperature (temperature switch in the motor) is at least 2 seconds too high (approx. 130°C).

▪ Wiring error: The temperature switch in the motor coil is not connected properly.
► Check the wiring.

▪ Wiring error: The shielding of the motor cable is not attached properly.
► Check the shielded terminal on the bottom of the MC-4 servo amplifier and the terminal boxes of the SM motor.

▪ The holding brake is not released.
► Release the brake.

▪ The motor is overloaded.
► Drive the system at a slower speed.
► Check the drive sizing.
► Use a larger motor for this application.

▪ Commutation error, i.e. the encoder is not aligned / leveled.
► Align / level the encoder.

▪ Hardware error: The temperature switch in the motor coil is defective.

- ▶ Replace the motor.

103 PowerOff due to cooling error

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): B

The internal temperature of the device is too high.

- ▪ Insufficient ventilation or ambient temperature too high.
- ▶ Check device fans and ventilation slots (if available).
- ▶ Check ventilation in switch cabinet.

- ▪ Hardware error: The temperature sensor is defective.
- ▶ Replace device.

104 PowerOff due to control voltage error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): B

The control voltage is incorrect.

- ▪ The control voltage is too low / a brief voltage failure of the 24 V DC has occurred.
- ▶ Check the 24 V control voltage.

105 Feedback error (track monitoring)

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): A

A hardware encoder error has occurred. The device that triggered this error must be reset.

- ▪ Wiring error: Encoder cable at the encoder or the servo amplifier / PacDrive controller has been removed or is defective.
- ▶ Check the encoder cable and replace if necessary.
- ▶ Check the ground connection (shield).

- ▪ The encoder voltage is unavailable or incorrect.
- ▶ Check the encoder voltage.

- ▪ Hardware error: the encoder is defective.
- ▶ Replace the encoder.

106 Communication error DC controller

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): A

An internal system error has occurred.

- ▪ EMV faults.
- ▶ Reset the PacDrive system (PacDrive controller and servo amplifier).

- ▪ Hardware error: The servo amplifier is defective.

- ▶ Replace the servo amplifier.

107 Excess current

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): A

The current through the output stage of the servo amplifier / in the DC bus of the network device is too high. In contrast to the 120 "Overload PowerOff of output stage" (see 8.5.2.21 120 Overload PowerOff of output stage) and 146 "DC bus overload" (see 8.5.2.47 146 DC bus overload) diagnosis messages, the power is switched off as soon as the max. current is exceeded.

- ▪ Servo amplifier wiring error: The motor cable is not connected properly / has a short circuit.
- ▶ Check the wiring.

- ▪ Servo amplifier: The current controller parameters are incorrect.
- ▶ Check the Curr_P_Gain, Curr_I_Gain and CurrFilter current control parameters and parameterized with default values if necessary.

- ▪ Servo amplifier hardware error: The motor has a short circuit.
- ▶ Replace the motor.

- ▪ PS-4 power supply: To many consumers (e.g. ServoDrive SCL) connected to the DC bus.
- ▶ Use an additional PS-4 power supply and distribute the power supply of the consumers.
- ▶ The existing arrangement of devices may be made adequate by adjusting one of the applications (e.g. decreasing acceleration).

108 Excess voltage

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): A

The DC bus voltage is too high (for 400 V AC devices greater than 860 V DC; for 230 V AC devices greater than 430 V DC).

- ▪ Wiring error: Bleeder is not connected.
- ▶ Connect bleeder.

- ▪ The braking energy of the motor that is fed back into the DC bus is too high and therefore results in voltage build-up.
- ▶ Brake at a slower rate.
- ▶ Check the dimensioning of the bleeder.
- ▶ Use additional brake resistance (bleeder module **BM-4**) with 400V AC devices.

- ▪ The mains voltage is too high.
- ▶ Check the mains supply.

- ▪ Hardware error: The servo amplifier is defective.
- ▶ Replace the servo amplifier.

109 Undervoltage

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): B

The DC link voltage is too low.

- For 400 V AC devices smaller than 480 V DC (smaller V00.20.00: 450 V DC)
- For 230 V AC devices smaller than 240 V DC (smaller V00.20.00: 225 V DC)
- Exception PS-4: smaller than 260 V DC

- The mains voltage is too low.
- ► Check mains voltage (see technical information).

- Parallel connected DC links - servo amplifier error.
- ► Locate servo amplifier with error and eliminate error.

110 Phase error (power supply)

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): B

Failure of one or two phases in the mains connection of the servo amplifier. The 131 "Phase failure of power supply warning" (see 8.5.2.32 131 Phase failure of power supply Warning) must have been pending 10 s in advance.

- Wiring error: Not all phases are connected properly / the mains contactor is not wired properly.
- ► Check the wiring.

- External fuse has activated.
- ► Check fuses.

111 Excessive following error

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): B

A very large following error has occurred - more than 8 times the value of the FollowingLimit.

- This error normally only occurs in conjunction with the CAM movement functions (e.g. MultiCam()).
- ► Check curve data.

- The axis should be RPM-regulated.
- ► Set parameter Pos_P_Gain to "0".

112 Communication error real-time bus

Diagnosis class (see 8.1 Diagnosis Classes) (default): 2
Reaction (see 8.2 Reactions): B

The servo amplifier did not receive a valid telegram over the real-time bus (SERCOS). The diagnosis message is not reported in the system because when an error occurs, the motor controller (MC-4, PS-4, SCL) cannot report the diagnosis code to the controller (e.g. C400) over the SERCOS bus. In this case, the 506 "Fatal SERCOS

error (MASTER)" (see 8.5.6.7 506 Fatal SERCOS error (MASTER)) diagnosis code is reported.

- The intensity of the fiber optic signal from the preceding device is too low or too high.
- ► Set the intensity according to specifications.

- Hardware error: Fibreoptic conductor is defective / signal is too weak as a result of deterioration.
- ► Increasing the intensity may solve the problem.
- ► Replace the fiberoptic conductor

- Hardware error: Defective PacDrive controller / servo amplifier.
- ► Replace PacDrive controller / servo amplifier.

113 Bleeder defective

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): A

A defect in the bleeder was detected by the device.

- Wiring: The bleeder/feed line has a short-circuit.
- ► Check the bleeder and feed lines.

- The bleeder is not dimensioned correctly (Ohm value too low).
- ► Check the bleeder sizing (also refer to the project planning guide and technical data).

- Hardware error: Bleeder defective.
- ► Measure bleeder.
- ► Replace bleeder if necessary.

- Hardware error: Servo amplifier defective.
- ► Replace the servo amplifier.

114 Error reading EEPROM

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): A

The check sum in the EEPROM is wrong. (Device-specific information such as device type, serial number, adjustment values etc. are stored in the EEPROM).

- Hardware error: The EEPROM is defective.
- ► Contact ELAU customer service.
- ► Replace servo amplifier.

115 Gate - power failure

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): A

There is no supply voltage at the output stage of the servo amplifier.

- Hardware error: Servo amplifier defective.

- ▶ Replace the servo amplifier.

116 Commutation error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): A

Unable to determine the commutation.

- ▪ Motor turns when starting (boot procedure) the MC-4 servo amplifier.
- ▶ Make sure that the motor is still when starting (boot procedure) the servo amplifier.

- ▪ Wiring error: encoder cable is not plugged in or defective.
- ▶ Check the wiring.

117 Reading error encoder EEPROM

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): A

Unable to read the correct data from the encoder EEPROM

- ▪ Wiring error: Encoder cable is not correct.
- ▶ Check the wiring.

- ▪ Hardware error: Encoder is defective.
- ▶ Change out the motor or the encoder.

118 Error on serial interface to encoder

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): A

The data transfer to the encoder is disrupted.

- ▪ Wiring error: Encoder cable is defective.
- ▶ Check the encoder cable and replace if necessary.
- ▶ Check the ground connection (shield)
- ▶ Check the jumpers in the encoder cable connector.

- ▪ The encoder voltage is unavailable or incorrect.
- ▶ Check the encoder voltage.

- ▪ Hardware error: Encoder is defective.
- ▶ Change out the motor or the encoder.

119 Short circuit or ground fault in output stage

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): A

The motor and motor lines are checked for short circuits (phase short circuit).

- ▪ Wiring error: Short circuit in motor cable.
- ▶ Replace the motor cable.

- Hardware error: Short circuit in the motor (phase to phase or phase to housing).
- ► Replace the motor.

- Hardware error: The output stage of the servo amplifier is defective.
- ► Replace the servo amplifier.

120 Overload PowerOff of output stage

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): B

The output stage is overloaded. In contrast to the 107 "Excess current" (see 8.5.2.8 107 Excess current)diagnosis message, the power is switched off as soon as the max. current value is exceeded. The thermal overload of the devices over a specific time period is observed.

- The output stage is overloaded.
- ► Check the motor / actuator.
- ► Check the calculation of the motor and the actuator.
- ► Drive the system at a slower speed.

- The motor brake is not open.
- ► Check the wiring of the motor brake (voltage reversal, cable break …).

- Hardware error: The servo amplifier is defective.
- ► Replace the servo amplifier.

112 Bleeder temperature too high

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): B

The braking resistor is overloaded.

- The drive has incorrect dimensions.
- ► Check drive sizing.

- Hardware error: The braking resistor or addressing is defective.
- ► Contact ELAU customer service.

112 Max. motor speed reached

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): B

The current motor speed is greater than the rated speed of the motor.

- Error occurs when using motor SH-055 with a rated speed greater than 6000rpm.
- ► Use firmware version no earlier than V00.22.00 in the servo amplifier MC-4.

- Error occurs with CAM movement function (e.g. MultiCam()) due to incorrect curves or profile data.
- ► Check curve data and program.

- Jumps occurred in the master encoder.
- ▶ Check master encoder.

- The error occurs during a CAM movement function due to an incorrect position manipulation (e.g. Setpos1() function).
- ▶ Check program.

- Hardware error: Commutation error, i.e. the motor encoder (SinCos) is not calibrated or leveled.
- ▶ Contact ELAU customer service.

123 Error inverter enable

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): A

The input Inverter Enable reached LOW while the drive was in control mode.

NOTE

If the drive is shut down by HW_Enable or ControllerEnable the controller is active until the drive stops and the brake then engages (BrakeCouplingTime).

- Wiring error.
- ▶ Check wiring of "Inverter Enable" input.

- Circuit error: The input "Inverter Enable" was set to LOW.
- ▶ Check addressing of "Inverter Enable" input.

124 PowerOff due to overload

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5
Reaction (see 8.2 Reactions): C

Overload PowerOff determined that torque was exceeded (Overload function).

You can switch the diagnosis message off using the OverloadErrorOff() function and switch it back on (default) using the OverloadErrorOn() function.

- An overload will occur if the overload function is active.
- ▶

125 "I^2t motor warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

The motor is overloading. The integrator (I2tparameter) has already increased to 80%. A 100 "I2T Motor" (see 8.5.2.1 100 I2T Motor) error may result.

126 Amplifier – overtemperature warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

The cooling element of the MC-4/SCL/PS-4 is too hot. A 101 "Amplifier – power off due to overtemperature" (see 8.5.2.2 101 Amplifier – power off due to overtemperature) error may result.

127 Overtemperature motor warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

The internal motor temperature (temperature switch in the motor) is too high (approx. 130°C). If the internal motor temperature (temperature switch in the motor) is too high for 2 seconds or longer, an error will occur. 102 "Motor - PowerOff due to overtemperature" (see 8.5.2.3 102 Motor - PowerOff due to overtemperature).

128 Cooling error warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

The internal temperature of the device is too high. With SCL, the internal power supply may also be overloaded. A 103 "PowerOff due to cooling error" (see 8.5.2.4 103 PowerOff due to cooling error) error may result.

129 Overload PowerOff of output stage warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

The output stage is overloaded. A 120 "Overload PowerOff of output stage" (see 8.5.2.21 120 Overload PowerOff of output stage) error may result.

130 Bleeder temperature rising

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

The bleeder is overloading. A 121 "Bleeder temperature too high" (see 8.5.2.22 112 Bleeder temperature too high) error may result.

131 Phase failure of power supply Warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

Failure of one or two phases in the mains connection of the servo amplifier. If the warning persists for 10 s or longer, a 110 "Phase failure (power supply)" (see 8.5.2.11 110 Phase error (power supply))error will occur.

132 Following error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

A position following error in the position controller of the servo amplifier has occurred that is greater than the "FollowingLimit" parameter.

- The following error monitoring is too strict.
- ► Increase the FollowingLimit object parameter.

- The acceleration is too high.
- ▶ Reduce acceleration.

- The following error is a result of the 100 "I2T Motor" diagnosis message.
- ▶ See diagnosis message 100 "I2T Motor" (see 8.5.2.1 100 I2T Motor)

- The mechanical system is sluggish or blocked.
- ▶ Check the travel range.

- Incorrect parameter settings.
- ▶ Check the controller parameters and the J_Load .

- The current feedforward is switched off.
- ▶ Set the CurrFeedForw parameter to "on / TRUE".

- Wiring error: The wires in the motor or encoder cable are interchanged.
- ▶ Check the cable connection /cable.

- Wiring error: An incorrect encoder connector or motor connector is plugged-in (possibly from the neighboring actuator).
- ▶ Check the encoder connecter and the motor connector.
- ▶ Check the encoder cable and motor cable.

- Wiring error: Holding brake not released.
- ▶ Check the holding brake.

- No mains voltage.
- ▶ Check the mains voltage at the servo amplifier.

- An encoder with the incorrect "resolution" (pulse oer revolution).
- ▶ Check the encoder.

- Hardware error: The coupling to the position controller is loose.
- ▶ Check the encoder coupling.

- Hardware error: Encoder signal jumps.
- ▶ Check the travel range.

- The axis should be operated at regulated speeds.
- ▶ Set the Pos_P_Gain parameter to 0.

133 Speed-dependent power reduction

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 7
Reaction (see 8.2 Reactions): E

Starting at a motor speed of < 75 rpm (112.5 rpm for SR058, 150 rpm for SM070) the maximum motor current is restricted to 70 % of the top current of the servo amplifier (e.g. MC-4). This is a security measure to protect the final stage of the servo amplifier when reaching the stop position.
The message will only be generated from V00.11.00, if the target current is actually restricted to 70 % of the top current.

In older versions the message is generated if the restriction is activated even if the target current is less than 70 % of the top current.

- The axis has reached the stop position.
- ► Check traversing range of the axis.

134 External 24V power supply too low

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 7
Reaction (see 8.2 Reactions): E

The control voltage (24 V DC) is too low.

- Control voltage too low.
- ► Check the control voltage (see the technical data on the device).

135 Undervoltage warning

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

An attempt has been made to start the drive but the DC link voltage is too low.

- For 400 V AC devices smaller than 480 V DC (smaller V00.20.00: 450V DC)
- For 230 V AC devices smaller than 240 V DC (smaller V00.20.00: 225V DC)
- Exception PS-4: smaller than 260 V DC

As of V00.20.00 the diagnostic message is also generated when the drive is "in control mode" (MC4State >=16#20) (except with PS-4). If the DC link voltage drops further while the drive is "in control mode", the diagnostic message 109 "under voltage" (see 8.5.2.10 109 Undervoltage) is triggered.

- Hardware Enable and Software Enable are there but the mains voltage is too low.
- ► Check mains voltage (refer also to technical information of device); the mains contactor may not be switched.

- Parallel connected DC links - servo amplifier error.
- ► Find servo amplifier with error.
- ► Eliminate error.

136 Inverter enable warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

An attempt is being made to start the drive, but Inverter Enable is still LOW.

- Hardware Enable and Software Enable are available, but "Inverter Enable" is still LOW.
- ► Activate "Inverter Enable".

137 Motorless

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): A

When switching the MC-4 servo amplifier from motorless to normal mode, a message reporting a motor error that has occurred will appear.

Motor errors that result in the diagnosis message:

- 102 Motor - PowerOff due to overtemperature (see 8.5.2.3 102 Motor - PowerOff due to overtemperature)
- 105 Feedback error (track monitoring) (see 8.5.2.6 105 Feedback error (track monitoring))
- 111 Excessive following error (see 8.5.2.12 111 Excessive following error)
- 116 Commutation error (see 8.5.2.17 116 Commutation error)
- 117 Reading error encoder EEPROM (see 8.5.2.18 117 Reading error encoder EEPROM)
- 118 Error on serial interface to encoder (see 8.5.2.19 118 Error on serial interface to encoder)
- 112 Max. motor speed reached (see 8.5.2.23 112 Max. motor speed reached)

The above error messages are disabled in the motorless mode (Motorless Parameter = yes) and result in the 137 "Motorless" error message when reverting to normal mode (Motorless parameter = no).

Note here that the 105, 117 and 118 diagnosis messages can also result in the 137 "Motorless" diagnosis message if the messages occur in normal mode and afterwards the mode is switched to motorless and then back to normal.

- A motor error has occurred.
- ► Perform a hardware reset on MC-4 or switch back to motorless mode.

- The MC-4 was not switched off when coupling a motor to a servo amplifier that was set to motorless. The servo amplifier was switched to normal mode afterwards.
- ► Perform a hardware reset on MC-4 or switch back to motorless mode.

138 Impermissible motor

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): A

An impermissible motor is connected to the servo amplifier.

- An SM 070 60 010 is connected to the MC-4 / 22 A.
- ► Use a "larger" motor (e.g. SM 070 60 020) or a "smaller" servo amplifier (e.g. MC-4 / 10 A).

- An SM 070 60 010, SM 070 60 020 or SM 100 50 030 is connected to the MC-4 / 50 A.
- ► Use a "larger" motor (e.g. SM 100 40 050) or a "smaller" servo amplifier (e.g. MC-4 / 10 A).

139 Error in DC-precharge

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): A (from **MC-4**/**PS-4** V00.16.30)
Reaction (see 8.2 Reactions): B (in **MC-4**/**PS-4** versions < V00.16.30)

The error message is issued when the mains voltage is present and the DC link voltage (of 450V DC for 400V AC devices or of 225V DC for 230V AC devices) has not been

achieved one second following switching on of the mains phases. Starting with V00.22.00 the monitoring time for the **PS-4** was reduced from 1s to 350ms. The setting of the parameter PhaseCheck (**MC-4**), or PhaseCheckMode (**PS-4**), has no influence on this error monitoring.

This monitoring protects the internal precharged switching.

- The parameter DC_LowCheck is "off".
- The mains voltage is falling and the drive remains in control mode.
  (If **DC_LowCheck** is "on", then diagnostic message 109 "under voltage" (see 8.5.2.10 109 Undervoltage) is displayed. This leads to a Reaction (see 8.2 Reactions) B and the drive does not remain in control mode.)
- The mains voltage increases again (drive is still in control mode!) when, e.g. a load is pressing on the axis (power consumption at shaft!)
  In so doing, enough energy is used that the DC circuit cannot be charged.

► Prevent fall in mains voltage while drive is in control mode.
► Switch off controller or final stage of servo amplifier when switching off the mains contactor (parameter ControllerEnable or input enable at the servo amplifier).

- Short circuit or ground fault in DC circuit wiring.

► Check wiring.

140 Ramp-down braking time-out

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): B

The maximum ramp down time was exceeded during control down ramping of motor.
When switching off

- ControllerEnable or
- HW_Enable or
- when an error occurs with **Reaction** B (best possible stoppage) or user driven stoppage

the ramp down time is determined by the parameter StopTimeLim. If the drive has not stopped at the end of the down ramp time, the brake engages and the error message **Ramp down time exceeded** is emitted. Following the expiry of the BrakeCoupling-Time the drive is connected torque free.

For error with **Reaction** C (Overload function) the ramp down time is firmly set at 800ms. If the drive is not still once the ramp down time has expired the error message **Ramp down time exceeded** with **Reaction** B is triggered. In so doing, the ramp down time (**StopTimeLim**) is restarted until the brake engages. Once the **BrakeCoupling-Time** is up, the drive is connected torque free.

- The load on the drive is too great to adhere to the set ramp down time.

► Check parameter **StopTimeLim**.
  If the diagnostic message occurs in conjunction with the **Overload Functions**, keep in mind that in this case the ramp down time is firmly set to 800ms and is thus triggered independently from **StopTimeLim**. In this case you need a more powerful motor / servo amplifier combination.

- Encoder in the motor defective (or commutation not OK).

- ▶ Replace motor.

141 EncoderPosition Reading Error

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 5
Reaction (see 8.2 Reactions): D

An error occurred when reading the calibration position from the motor encoder.
The diagnostic message will be replaced as of MotorController Firmware 00.20.00 by the diagnostic message 170 "Reading error DrvEncPosition" (see 8.5.2.71 170 DrvEncPosition reading error).

- The function DrvEncSetPosition() was called up but could not be properly processed.
- ▶ Call up function DrvEncSetPosition() again.

- Encoder in motor defective
- ▶ Replace motor.

142 Board - PowerOff due to overtemperature

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): B

The temperature of the board inside the SCL housing is too high.

- Ventilation is inadequate or the ambient temperature is too high.
- ▶ Check the switching cabinet ventililation system.
- ▶ If installed, make sure the air conditioning unit (if available) is functioning properly.

- Hardware error : The temperature sensor is defective.
- ▶ Replace the device.

143 Encoder temperature warning

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

The temperature inside the encoder is too high.

- Ventilation is insufficient or ambient temperature is too high.
- ▶ Check device fans and ventilation openings (if available).
- ▶ Check ventilation in switch cabinet.
- ▶ Check function of air conditioner (if available).

- Hardware error: The temperature sensor is defective.
- ▶ Replace device.

144 DC bus short circuit

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): A

A short circuit has occurred in the DC bus.

- Wiring error:
  The connection cables between PS-4 and PD-8 or PD-8 and PD-8 are not connected properly or have a short circuit.
  The motor cable has a short circuit.

► Check the cable and replace if necessary.

145 DC bus ground fault

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): A

A ground fault has occurred.

- Wiring error:
  The connection cables between PS-4 and PD-8 or PD-8 and PD-8 are not connected properly or have a ground fault.
  The motor cable has a ground fault.

► Check the cable and replace if necessary.

146 DC bus overload

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): B

The DC-circuit is overloaded. In this case, unlike diagnostic message 107 "overcurrent" (see 8.5.2.8 107 Excess current), switch off does not occur as soon as the current threshold has been exceeded. The thermal overload of the device is observed for a specific period of time.

- Too many loads (e.g. ServoDrive SCL) are connected to the DC circuit.

► It may be that the existing device constellation will be sufficient by adapting the application (e.g. less acceleration).
► Use another mains device PS-4 and distribute supply of loads.

147 24V power supply overload

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): B

The 24 V available at the output of the PS-4 to supply the ServoDrive SCL is overloaded.

- Wiring error. Short-circuit occurred.

► Check wiring of the 24 V supply from the PS-4 via the PD-8 incl. the motor cable.

- There are too many loads (e.g. ServoDrive SCL) connected to the 24 V supply.

► Use another PS-4 power supply unit and divide up the supply of the loads.

148 Internal voltage error 15V

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): A

The device-internal 15 V voltage is too low.

- The device is defective.

- ▶ Replace the device.

149 Internal voltage error 12V

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): B

The device-internal 12 V voltage is too low.

- ▪ The device is defective.
- ▶ Replace the device.

150 Phase L1 failure

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): B

The L1 phase of the mains connection to the device has failed or is too low.

- ▪ Wiring error.
- ▶ Check the connection of the phase.
- ▶ Check the wiring of the mains contactor.

- ▪ External fuse has activated.
- ▶ Check fuses.

- ▪ The mains contactor is defective.
- ▶ Replace the mains contactor.

151 Phase L2 failure

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): B

The L2 phase of the mains connection to the device has failed or is too low.

- ▪ Wiring error.
- ▶ Check the connection of the phase.
- ▶ Check the wiring of the mains contactor.

- ▪ External fuse has activated.
- ▶ Check fuses.

- ▪ The mains contactor is defective.
- ▶ Replace the mains contactor.

152 Phase L3 failure

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction: B

The L3 phase of the mains connection to the device has failed or is too low.

- ▪ Wiring error.
- ▶ Check the connection of the phase.
- ▶ Check the wiring of the mains contactor.

- External fuse has activated.
- ► Check fuses.

- The mains contactor is defective.
- ► Replace the mains contactor.

153 DC bus discharge failure

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): B

DC bus was not discharged properly.

- Too much braking energy is being fed from the connected SCL back into DC bus.
- ► Decelerate the drives before discharging (at a reduced rate of speed if necessary) and then start the discharge procedure.

- Incorrect shutdown sequence; phase voltage has been present for too long (see also 159 "DC bus no discharged warning" (see 8.5.2.60 159 DC bus no discharged warning)).
- ► Allow the mains contractor to release before activating the discharge.

- The bleeder (responsible for the discharge) reaches its maximum load when the discharge begins.
- ► Decelerate the drives before discharging (at a reduced rate of speed if necessary) and then start the discharge procedure.

154 Phase L1 warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

The L1 phase of the mains connection to the device has failed. If the warning persists for 10 s or longer, the system issues the error message, 150 "Phase L1 failure" (see 8.5.2.51 150 Phase L1 failure).

155 Phase L2 warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

The L2 phase of the mains connection to the device has failed. If the warning persists for 10 s or longer, the system issues the error message, 151 "Phase L2 failure" (see 8.5.2.52 151 Phase L2 failure).

156 Phase L3 warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

The L3 phase of the mains connection to the device has failed. If the warning persists for 10 s or longer, the system issues the error message, 152 "Phase L3 failure" (see 8.5.2.53 152 Phase L3 failure).

157 DC bus overload warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

The load of the DC bus is at 80%. This is displayed by the parameter DC_BusOverload . An error message will be triggered if the load reaches 100%. 146 "DC bus overload" (see 8.5.2.47 146 DC bus overload).

158 24V power supply overload warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

The load of the 24V power supply for the SCL ServoDrives is at 80%. An error message will be triggered if the load reaches 100%. 147 "24V power supply overload" (see 8.5.2.48 147 24V power supply overload).

159 DC bus no discharged warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

An attempt was made to discharge the DC bus, but the mains voltage is still present. If the DC bus voltage does not decrease to 25 V within 200 ms of this warning appearing, the system issues the error message 153 "DC bus discharge failure" (see 8.5.2.54 153 DC bus discharge failure) is triggered.

- Wiring error: The mains contactor is not controlled correctly.
- ► Check the wiring.

160 Undervoltage power stage driver

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction (see 8.2 Reactions): A

The supply voltage of the power stage driver is too low.

- Hardware error: Device is defective
- ► Replace the device.

161 Overtemperature board warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

The temperature of the board in the SCL housing is too high. If the temperature continues to rise, the message 142 "Board - PowerOff due to overtemperature" (see 8.5.2.43 142 Board - PowerOff due to overtemperature)will be triggered.

162 Wiring error O_0

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5
Reaction (see 8.2 Reactions): B

There is a wiring error at Pin 1 of the sensor/actor connector of the SCL.

- The output is short circuited or overloaded.
- ► Check the wiring of the output.

- Hardware error: The output function block is defective.

► Replace the device.

163 SERCOS: C1D error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction: Manufacturer-specific

A SERCOS error in diagnosis class 1 (C1D) has occurred. The extended diagnosis contains a data word that provides information on the exact cause.

⚠ WARNING

The meaning of the data word has changed!
Incorrect interpretation of the error message.
- Refer to the operating instructions of the SERCOS device.

The individual bits of this data word have the following meanings:

Bit	Meaning
Bit 0	overload shut-down
Bit 1	amplifier overtemperature shut-down
Bit 2	motor overtemperature shut-down
Bit 3	cooling error shut-down
Bit 4	control voltage error
Bit 5	feedback error
Bit 6	error in the "commutation" system
Bit 7	overcurrent error
Bit 8	overvoltage error
Bit 9	undervoltage error
Bit 10	power supply phase error
Bit 11	excessive position deviation
Bit 12	communication error
Bit 13	overtravel limit is exceeded (shut-down)
Bit 14	Reserved
Bit 15	manufacturer-specific error (see #1164)

Table 8-4: SERCOS C1D error (assignment according to SERCOS specifications)

164 SERCOS: C1D manufacturer-specific error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1
Reaction: manufacturer-specific

A manufacturer-specific SERCOS error in diagnosis class 1 (C1D) has occurred. The extended diagnosis contains a data word that provides information on the exact cause. For information on what each bit means, refer to the manual of the SERCOS device manufacturer.

165 SERCOS: C2D warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction: manufacturer-specific

A SERCOS warning in diagnosis class 2 (C2D) has occurred. The extended diagnosis contains a data word that provides information on the exact cause.

⚠ WARNING

The meaning of the data word has changed!
Incorrect interpretation of the error message.
- Refer to the operating instructions of the SERCOS device.

The individual bits of this data word have the following meanings:

Bit	Meaning
Bit 0	overload warning
Bit 1	amplifier overtemperature warning
Bit 2	motor overtemperature warning
Bit 3	cooling error warning
Bit 4	reserved
Bit 5	positioning velocity ? nLimit
Bit 6	reserved
Bit 7	reserved
Bit 8	reserved
Bit 9	Undervoltage warning (bus voltage)
Bit 10	Reserved
Bit 11	excessive velocity deviation
Bit 12	Reserved
Bit 13	Target position outside of travel range
Bit 14	Reserved
Bit 15	Manufacturer-specific error (see #6166)

Table 8-5: SERCOS C2D warning (assignment according to SERCOS specifications)

166 SERCOS: C2D manufacturer-specific warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction manufacturer-specific

A manufacturer-specific SERCOS warning in diagnosis class 2 (C2D) has occurred. The extended diagnosis contains a data word that provides information on the exact cause. For information on what each bit means, refer to the manual of the SERCOS device manufacturer.

167 SERCOS: C3D operation status

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 9

A SERCOS: C3D operation status of diagnosis class 3 (C3D) has changed. The extended diagnosis contains a data word that provides information on the exact cause.

⚠ WARNING

The meaning of the data word has changed!
Incorrect interpretation of the error message.
- Refer to the operating instructions of the SERCOS device.

The individual bits of this data word have the following meanings:

Bit	Meaning
Bit 0	n(feedback) = n(command)
Bit 1	n(feedback) = 0

Bit	Meaning
Bit 2	| n(feedback) | < | n(x) |
Bit 3	| T | >= | T(x) |
Bit 4	| T | >= | T(limit) |
Bit 5	| n(command) | > | n limit |
Bit 6	in position
Bit 7	| P | >= | P(x) |
Bit 8	Position feedback = Active target position
Bit 9	| n(feedback) | <= minimum spindle speed
Bit 10	| n(feedback) | >= maximum spindle speed
Bit 11	In coarse position
Bit 12	Target position attained
Bit 13	Interpolator halted
Bit 14	Reserved
Bit 15	Manufacturer-specific operation status (see #9168)

Table 8-6: SERCOS C3D operation status (assignment according to SERCOS specifications)

168 SERCOS: C3D manufacturer-specific status

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 9
Reaction manufacturer-specific

A manufacturer-specific SERCOS operation status of diagnosis class 3 (C3D) has changed. The extended diagnosis contains a data word that provides information on the exact cause. For information on what each bit means, refer to the manual of the SERCOS device manufacturer.

169 Single SERCOS error (SLAVE)

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

A temporary signal fault on the SERCOS bus has been detected. The MDT data may now be incorrect due to this fault. In this case, the data of the last cycle is reused.

Temporary faults can have the following causes:

- Signal distortion
- Loss of more than 10 signal edges (fibreoptic b reak)
- Failure of the master synchronous telegram (MST)
- Failure of the master data telegram (MDT)

- Signal over the SERCOS fiberoptic conductor is incorrect.
- ► Check the intensity setting in the PacDrive controller and on the servo amplifier.
- ► Check the fiberoptic conductor.

- EMC problems.
- ► Check the wiring.

- SCL-055 motors are connected at the PacDrive controller. The SCL-055 motors in the PacDrive PD-8 box are not connected properly.
- ► Check the connection of the SCL-055 motors in the PacDrive PD-8 box. Simply placing jumpers on the desired terminals will not resolve the problem. Slaves must not be inserted into the following SERCOS slot.

In addition, follow the notes in the "SCL" and "PS-4 and PD-8" operating instructions.

170 DrvEncPosition reading error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2
Reaction (see 8.2 Reactions): B

The error message is triggered when an error occurs as the position is being read from or written to the electronic type plate of the motor. Writing to the position occurs by using the function DrvEncSetPosition().dd
This diagnosis message replaces the diagnosis message 141 "Reading error encoderposition" (see 8.5.2.42 141 EncoderPosition Reading Error) in MotorController firmware version 00.20.00 or higher.

- The DrvEncSetPosition() function was called and could not be processed properly.
- ▶ Call the DrvEncSetPosition() function again.

- Encoder in the motor is defective.
- ▶ Replace the motor.

171 Encoder communication warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): D

An error occurred in reading the encoder via the serial interface.

- Wiring error: Encoder cable is not correct.
- ▶ Check the wiring.

- Hardware error: Encoder is defective.
- ▶ Change out the motor or the encoder.

172 Extended diagnosis message

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 8
Reaction (see 8.2 Reactions): E

For now, this diagnosis message is only intended for ELAU internal use. To view the diagnosis message in the **message logger**, **Filter Typ 15** must be selected via **Set filter ...**.

173 Feedback warning (track monitoring)

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 8
Reaction (see 8.2 Reactions): E

For now, this diagnosis message is only intended for internal ELAU use. To view the diagnosis message in the message logger, **Set filter...** must be used to set **Filter Type 15**.

174 Excess current warning

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6
Reaction (see 8.2 Reactions): E
Filter type 2 "Diagnosis messages"

In the power supply, **PS-4** the **"Excess current warning"** will be triggered in hardware code xx3xxx if a DC bus current of more than 50A is present for at least 1ms . The error message 107 "Excess current" (see 8.5.2.8 107 Excess current) will be generated if the DC bus current reaches 55A .

- Too many consumers (e.g. ServoDrive**SCL**) is connected to the DC bus.
- ► Use an additional **PS-4** power supply and distribute the power supply of the consumers.
- ► The existing arrangement of devices may be made adequate by adjusting one of the applications (e.g. decreasing acceleration).

175 Bleeder overload

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 9
Reaction (see 8.2 Reactions): E
Filter type 2 "Diagnosis messages"

If a Bleeder-I2t of 86% is reached with **MC-4** and **PS-4** , the **"Bleeder overload"** message may be triggered.

This message is assigned by default to **diagnosis class** 9 and therefore is not visible. If you want to respond to the diagnosis message, you can reconfigure the **diagnosis class** (e.g. **diagnosis class** 7 or 8).
At 100% **Bleeder-I2t**, the bleeder will be deactivated without further notification (as before). Only if the DC bus voltage increases to 860V , the error message (as previously) 108 "Excess voltage" (see 8.5.2.9 108 Excess voltage) is generated.

- The braking energy of the motor that is fed back into the DC bus is too high and therefore results in voltage build-up.
- ► Brake at a slower rate.
- ► Check the dimensioning of the bleeder.
- ► Use additional bleeder modules (**BM-4**) with 400V AC devices.

8.5.3 2xx "Object managing" diagnosis messages

200 Faulty logical address of parameter

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

An object or a parameter is being accessed that is not in the control configuration. In the ext. diagnosis in the message logger, logical address is displayed.

- An object or a parameter from the IEC program is being accessed that is not in the control configuration.
- ► Check the program.
  Please contact our application support department.

- Subsequent errors from 209 "last boot failed" diagnosis message.

- ► See diagnosis message 209 "Last boot failed" (see 8.5.3.10 209 Last boot failed).dd

- ▪ The configuration file on the controller is incorrect.
- ► Transfer the configuration file to the controller again.

201 Faulty parameter type code

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The type code of a parameter is incorrect.

- ▪ Software error
- ► Contact your ELAU representative.

202 Faulty configuration file

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The configuration file is no longer readable.

In controller firmware version 00.16.30 or higher, the name of the temporary configuration file is displayed in the ext. diagnosis in the message logger.

- ▪ There is no configuration file in the PacDrive controller or the configuration file is defective.
- ► Transfer the configuration file with EPAS-4 again.

203 Faulty parameter file

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The parameter file is not readable.

In controller firmware version 00.16.30 or higher, the name of the temporary parameter file is displayed in the ext. diagnosis in the message logger.

- ▪ There is no parameter file in the PacDrive controller or the parameter file is defective.
- ► Transfer the parameter file with EPAS-4 again.

204 IEC program cannot be loaded

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

Unable to load the IEC program.

Additional information on how to limit errors is stored in the DiagExtCode or the ext. diagnosis in the message logger.

Ext. diagnosis	Meaning
prog xhhhhhhhh	IEC program code is too big
bad version	The IEC program is not compatible with the PacDrive controller firmware (V00.10.00 or higher)
data xhhhhhhhh	IEC data area is too large -> adjust number of data segments
ret xhhhhhhhh	The retain area is too large
DOWNLOAD	Unable to load and prepare the IEC program.
.. miscellaneous	Other data errors

Cause of "data xhhhhhhhh":

A project was developed for an older version of the PacDrive controller firmware. In this project, the number of data segments is greater than two (e.g. three). If you now transfer the program to the controller, EPAS-4 will display the following message after the transfer is complete: "IEC program cannot be loaded!"

- ► If this happens, reduce the number of data segments to two and transfer the project to the controller again after the conversion process is complete.

Cause of "DOWNLOAD":

A subsequent error is involved in this case.

- ► Refer to the previous error message (e.g. 312 "Parameter relocation failed" (see 8.5.4.13 312 Parameter relocation failed)).

- ▪ There is no IEC program in the PacDrive controller or the IEC program is incompatible.
- ► Transfer the IEC program again using EPAS-4.

- ▪ The IEC program code, IEC data area or IEC retain area in the PacDrive controller is too large.
- ► See DiagExtCode.
- ► Adjust project.

- ▪ The setting in EPAS-4 > Project > Options > Conversion options in the item "Number of Data Segments" is less than 2 (DiagExtCode = ret xhhhhhhhh).
- ► Increase the number of data segments.

205 Impermissible parameter value

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A parameter has an impermissible value. The DiagExtCode parameter in the control configuration or message logger can be used to determine the logical address of the parameter that contains an impermissible value. This allows assignment to the control configuration.

- ▪ **Ext. diagnosis: BaudRate=<impermissible value>M**
  In V00.15.00 or higher, the PacDrive controller supports the BaudRate SERCOS parameter.
  2, 4, 8 and 16 MBaud values are supported in general.
  Only specific values are supported depending on the type of PacDrive controller (Max-4, CXX, PXX). Each value is dynamically checked when written. Incorrect

values are not transferred. Diagnosis message 205 "Impermissible parameter value" is triggered.
- ▶ Enter a valid BaudRate value.

- I=0Bxx0004; i.e., a value is entered that is either too small or too large for acceleration.
- ▶ Enter a valid acceleration value.

- I=03xx0025; i.e. the J_Load in the control configuration is too large.
- ▶ Enter a valid J_Load value.

- I=01010004; i.e. the IP_Gateway in the control configuration does not match the IP_SubNetMask.
- ▶ Only use standard IP address names.

206 Faulty ObjType of LogAdr

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

No object with the type code exists. The DiagExtCode parameter in the control configuration or message logger can be used to determine the logical address of the parameter that contains an impermissible value. This allows assignment to the control configuration.

- Subsequent error of diagnosis message 209 "Last boot failed" (see 8.5.3.10 209 Last boot failed).
- ▶ See 209 "Last boot failed" diagnosis message.

- Software error
- ▶ Contact your ELAU representative.

207 Hardware module does not exist

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A hardware module was entered into the control configuration that does not exist in the real system. The DiagExtCode parameter in the control configuration or message logger can be used to determine the type of the hardware module.

- A non-existent analog input or physical encoder was entered into the control configuration.
- ▶ Check the control configuration.

- Hardware error: The hardware module was not detected or is defective.
- ▶ Replace the PacDrive controller or optional module.

208 Too many real axes in config

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The number of axes in the control configuration is too large.

NOTE

In V00.15.00 or higher, the diagnosis message is replaced by the 518 "Too many real SERCOS Slaves" (see 8.5.6.18 518 Too many real SERCOS Slaves) diagnosis message.

- The number of axes for the CycleTime is too large.
- ▶ Check the CycleTime

- The PacDrive controller has a limited number of axes.
- ▶ Check the PacDrive controller type by referring to the type plate.

209 Last boot failed

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A drop in the control voltage of the PacDrive controller, a reset of the PacDrive controller or a fatal error occurred in the last boot procedure. Use DiagExtCode to localize the problem.

While booting, the PacDrive controller logs the individual phases in the NvRam. If this results in a fatal error (err LED continually ON), then the next boot will use the default configuration and diagnosis message 209 will be triggered.

⚠ CAUTION

If the PacDrive controller is started in minimal boot mode, the configuration and the control configuration parameters will be set to their default values.
TCP / IP – address is set to its default value
A configured modem is not available.
Subsequent errors will result when loading the IEC program (e.g. diagnosis messages 200 and 206).

NOTE

The third startup will occur in normal boot mode.
If this does not happen, the default configuration will used for the next startup, and the process will be repeated ... !

DiagExtCode	Meaning
1	Boot procedure begins before kernel initialization
2	Kernel initialization complete; FTP server priority adjusted; Time Slicing switched on; System clock; No. Tick per second defined
3	Init logger and NvRam complete; interrupts blocked
31	Before ScanDisk
4	Diag created, messages sent, before ObjectContr new
10	Begin Constructor ObjVerObjektContr; Tasklock active
11	Config and Par file read
12	Config file evaluated, generate before objects
13	generate after objects
14	set after CycleTime
15	after init of Moni.Max, LogGeb, VirtGeb, PhyGeb, construction of RTP before filling in indication table

DiagExtCode	Meaning
16	set after parameter
17	after Sercos startup
18	after runtime system start
19	after RTP start, before IEC program load
20	after IEC program load
5	after ObjectContr new
6	after axis release, before WatchDogEin
RAM < 32MB	Insufficient RAM in the PacDrive controller

Procedure:

- Read out and evaluate EPAS-4 connection with TCP/IP default address or serial
- message logger (important DiagExtCode!)
- The DiagExtCode can be used to read which phase of the boot procedure was executed correctly the last time.

NOTE

If the PacDrive controller is booted using the minimal configuration settings (LED blinks quickly), then the program, parameter and configuration will always be available for download in the download box when you log in with the EPAS-4 (V00.07.00 or higher).
This does not indicate different versions of the files on the PacDrive controller!
Since the PacDrive controller was booted in the default configuration, the 206 Faulty type code of LogAdr (see 8.5.3.7 206 Faulty ObjType of LogAdr)diagnosis message will be triggered when downloading the IEC program since the program will use parameters that are not available.

- The SysReset() function was called, although the boot procedure of the PacDrive controller is not yet complete.
  ▶ Use the GetPacDriveBootState() function to make sure that the PacDrive contoller has stopped the boot procedure before you use the SysReset() function.

- DiagExtCode = 19: Program error; i.e. the IEC program file is incorrect.
  ▶ Overwrite the IEC program on the PacDrive controller by transferring the IEC project (dummy) with the default configuration.
  ▶ Check your program and send an error-free project to the PacDrive controller.

- DiagExtCode is not 19.
  ▶ Contact your ELAU representative.

- The PacDrive controller was booted twice in quick succession. This may have been caused by pressing the reset button twice or a drop in the control voltage.
  ▶ Check the control voltage (also refer to the technical data).

- Insufficient RAM in the PacDrive controller for the project (DiagExtCode=out of memory).
  Meaning:
  A memory requirement could not be executed. Memory requirements are executed when booting, resetting the IEC task, calling a system functional block, setting/reading parameters, establishing/terminating an FTP connection, transferring data (remote device), communicating with EPAS-4, establishing/terminating a Telnet connection and communicating with Telnet.

- ► Reduce configuration.
- ► RamDiskSize must be decreased.
- ► Reduce number of tasks.
- ► Apply a PacDrive controller that has more RAM.

- ▪ A PacDrive controller with version 00.15.00 or higher is being used.
  The user data area was increased from 2 MB to 3.7 MB in this version. If the PacDrive controller has less than 32 MB of RAM, the PacDrive will start up in minimal boot mode.
- ► Use a PacDrive controller that has least 32 MB of RAM or firmware version V00.15.00 or lower.

210 Last boot failed

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

This diagnosis message is used to differentiate from the 209 "Last boot failed" (see 8.5.3.10 209 Last boot failed) message for minimal boot (boot not complete). In such a case the last boot failed.

Ext. diagnosis: RAM < 32MB

- ▪ If this diagnosis message appears, the minimal boot is also in error. However, this is caused by having insufficient RAM in the MAx-4 PacDrive controller (RAM<32 MB).
- ► Replace MAx-4 PacDrive controller with a device that has newer hardware
  or
  Use an older firmware version in the MAx-4 PacDrive controller (Voo.15.03 or lower).

211 Invalid configuration

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A configuration error has occurred.

Cause, Firmware V00.20.00:

The Connector parameter is set for the "Bottom / 1" connector, but there is no expansion module present in the PacDrive controller (C600 or P600).

- ► Check the Connector parameter in the control configuration.
- ► Check whether an expansion module is present in the PacDrive controller.

Cause, Firmware V00.16.41:

This diagnosis message will be triggered if there are two field buses configured in PacDrive controller C600 or P600 that cannot be connected at the same time.
CAN Layer2 and DeviceNet Slave are configured;
or CANopen Master and DeviceNet Slave are configured;
or PROFIBUS DP master and PROFIBUS DP slave are configured.

- ► Check the control configuration.

8.5.4 3xx "General" diagnosis messages

300 Division error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A division by "0" should be executed in the IEC program.

NOTE

The division by "0" is defined for REAL and LREAL and hence does not generate the 300 "Division error" diagnosis message.

- The divisor was zero in an IEC division function.
- ▶ Include division by "0" in the IEC program.
- ▶ Check the number range.

301 Coprocessor segment overflow

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A system error has occurred.

- An internal system error has occurred.
- ▶ Please contact your ELAU representative.

302 Stack error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A system error has occurred.

- An internal system error has occurred.
- ▶ Please contact your ELAU representative.

303 General protection error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A system error has occurred.

- An internal system error has occurred.
- ▶ Please contact your ELAU representative.

304 Coprocessor error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A system error has occurred.

- An internal system error has occurred.
- ▶ Please contact your ELAU representative.

305 Memory limit exceeded

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A system error has occurred.

- An internal system error has occurred.
- ► Please contact your ELAU representative.

306 Arithmetic overflow

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A system error has occurred.

- An internal system error has occurred.
- ► Please contact your ELAU representative.

307 Double execution error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A system error has occurred.

- An internal system error has occurred.
- ► Please contact your ELAU representative.

308 Invalid task state segment

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A system error has occurred.

- An internal system error has occurred.
- ► Please contact your ELAU representative.

309 No memory segment

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A system error has occurred.

- An internal system error has occurred.
- ► Please contact your ELAU representative.

310 Faulty memory segment adjustment

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A system error has occurred.

- An internal system error has occurred.
- ► Please contact your ELAU representative.

311 Coprocessor division error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A system error has occurred.

- An internal system error has occurred.
- ► Please contact your ELAU representative.

312 Parameter relocation failed

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A system error has occurred.

- The IEC program does not match the active configuration.
- ► Transfer the project again.

313 Excessive cycle time overrun

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The fatal cycle error of an IEC task is reported when the 10x cycle time (see task configuration) is exceeded.
The task then receives the status of error. This situation can be solved only by resetting the controller (Online > Reset PacDrive controller). The cycle time monitoring of the IEC task refers to the load parameter that is displayed in the IEC task expansion object in the controller configuration.

- The processing time of a parameter or system functional block that is being called is taking "too long".
- ► Check the program (e.g. access to SERCOS Parameter or WaitTime() function).

- The time interval in the task configuration is too short.
- ► Increase the time interval in the task configuration.

314 Program file defective

(only in versions below 00.07.00)
Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A system error has occurred.

- The check sum of the program is incorrect.
- ► Transfer the program again.

315 Library function not implemented

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The program used an interface library that is not supported or not fully supported by the current PacDrive controller. (For the name of the function, see DiagExtCode)

- Firmware in the PacDrive controller is obsolete.
- ► Update the firmware in the PacDrive controller.
- ► Using older library versions may also work.

316 Faulty NvRam CRC

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6

The NvRam lost the data. This means that the data in the message logger and the IEC variable values have been deleted.

- **"Object" in the message logger: "MAX4"**
  The PacDrive controller has not been switched on for over 7 days (control voltage!).
- ▶ Reboot the PacDrive controller. The error should now be resolved.

- **"Object" in the message logger: "PN4"**
  The internal or external battery on the PN-4 optional module is empty and the PacDrive controller has not been switched on in over 7 days (control voltage!).
- ▶ Reboot the PacDrive controller. The error should now be resolved.

- **"Object" in the message logger: "MAX4"**
  Ext. diagnosis in message logger: Nvram damaged
  The NvRam on the PacDrive controller is defective.
- ▶ Replace the PacDrive controller.

- **"Object" in the message logger: "PN4"**
  Ext. diagnosis in message logger: Nvram damaged
  The NvRam on the PN-4 optional module is defective.
- ▶ Replace the PN-4 optional module.

- Hardware error: The buffer capacitor is defective.
- ▶ Replace the PacDrive controller.

317 Cycle time overrun

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6

A cycle time error has been found. This error is triggered when the cycle time exceeds one system clock tick (default value for a system clock tick is 250 µs or 1 ms with the C200). The DiagExtCode shows the "current cycle time" / "cycle time from the task configuration" in ms.

318 Calculated profile deleted

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

An attempt was made to calculate a profile (e.g. CamMasterStart()) that was just deleted with the ProfilDelete() . The DiagExtCode displays the profile in hexadecimal form (e.g. Prof=1001000).

- Program error: The profile to be calculated was deleted too early or the wrong profile was deleted.
- ▶ Check the program.

319 TPEdge not valid at 4ms

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

The touchprobe measurement is not valid at the specified CycleTime of 4 ms.

- A cycle time of 4 ms is specified in the control configuration and the PacDrive controller hardware does not support the touchprobe measurement correctly for this cycle time.
- ▶ Set the cycle time to 1 or 2, if possible.

- ▶ Update the PacDrive controller hardware.
  Contact your ELAU representative.

320 Bad array access (check)

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

An array access error in the IEC user program was found by the Check.lib. The message logger call hierarchy function can be used to "backtrace" the function block call or nesting.

- ▪ While accessing an array, the area limits of that array were breached in the IEC user program.
- ▶ Check the IEC program.

321 Division by zero (check)

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

A division by zero was found in the IEC user program by the Check.lib. The message logger call hierarchy function can be used to "backtrace" the function block call or nesting.

- ▪ A division by zero should executed in the IEC program.
- ▶ Include division by "0" in the IEC program.
- ▶ Check the number range.

322 Exception by IEC task

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

If an IEC task detects a fatal error (e.g. access error using pointer), it triggers a diagnosis message. The message logger call hierarchy function can be used to "backtrace" the function block call or nesting.

323 String too long

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

The maximum string length (255) was found in the IEC user program by the Check.lib. The message logger call hierarchy function can be used to "backtrace" the function block call or nesting.

- ▪ The maximum string length in the IEC user program was exceeded.
- ▶ Check the IEC program.

324 UPS internal failure

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

There is an internal error in the UPS.

- ▪ The battery of the UPS is empty.
- ▶ Charge the battery.

- ▪ The power supply of the UPS is working, but the "ON/OFF" input of the UPS is set to OFF.

► If the voltage supply is correct, then the "ON/OFF" input must be ON in order to use the UPS.

▪ A UPS object is specified in the control configuration, but no UPS is connected.
► Connect the UPS or adjust the control configuration.

▪ An internal UPS error has occurred.
► Check the UPS.

Ext. diagnosis: "PIC fail" or "State = 5"

▪ An internal error in the PIC controller has occurred.
► Contact your ELAU representative.

325 File corrupt

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

A problem (File not available or CRC error) has occurred while reading the retain file. The retain file will be read by the flash disk while the PacDrive controller boots if the Enable parameter of the UPS object is set to "External / 1".

▪ A UPS object is specified in the control configuration, but no UPS is connected.
► Connect the UPS or adjust the control configuration.

▪ The UPS is not functioning properly.
► Check the UPS.

326 Unsupported function

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

A function has been called that is not supported by the PacDrive system. More information on the object type and the instance is displayed in the message logger. The DiagExtCode also provides information on the error cause.

▪ The PacDrive controller hardware does not support this function.
► Check the hardware version in reference to the type plate and the MAx4Type.dd parameter.

327 Invalid PositionSource

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6

The CamTrack in the PositionSource parameter contains an invalid value.

▪ The symbolic name of a logical encoder or an axis (MC-4 or SCL) was not specified in the PositionSource parameter.
► Check the value in the PositionSource parameter.

328 Invalid Destination

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6

The CamTrack in the Destination parameter contains an invalid value.

- The Destination parameter was specified either without the symbolic name of an output group or with "none".

► Check the value in the Destination parameter.

329 Invalid BitNumber

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6

The CamTrack in the Bitno parameter contains an invalid value.

- An invalid bit number was specified in the Bitno parameter.

► Check the value in the Bitno parameter.

330 Bad master parameter data

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

This diagnosis message will be triggered if the system is unable to process the master positioning job of an axis even though no errors were detected by the job parameter area checks (e.g. error in the precalculation of generator data).

The error is shown in the extended diagnosis message as "GT=XXX,MJId=YYY". XXX indicates the generator type while YYY indicates the Master-JobId of the job that caused the problem.

Generator type:
0 -> CAM
1 -> POS

- Internal calculation error.

► Contact your ELAU representative.

331 Licensing

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

This diagnosis message will be triggered by the license server of the PacDrive controller (e.g. C600) if a function block is used without a sufficient number of points. The 331 "Licensing" error (can be acknowledged) will be triggered first so as to notify the user that the remaining run time of the system is only six hours. Then all functions can be used without restrictions until the evaluation phase of six hours has elapsed. When this time period has elapsed, a high priority error (see 8.5.4.33 332 Licensing) that cannot be acknowledged is triggered. After a few minutes (about 5 min.), the SERCOS bus is shut down, making any further use of the affected controller impossible.

- The number of license points on the compact flash card of the PacDrive controller is not sufficient.

► Check the number of required licensing points based on the Licensing parameter in the control configuration.

332 Licensing

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

This diagnosis message will be triggered by the license server of the PacDrive controller (e.g. C600) if a function block is used without a sufficient number of points. The 331 "Licensing" (see 8.5.4.32 331 Licensing) error message (can be acknowledged) will be triggered first so as to notify the user that the remaining run time of the system

is only six hours. Then all functions can be used without restrictions until the evaluation phase of six hours has elapsed. After this period of time runs out a high-priority error is triggered that cannot be acknowledged. After a few minutes (about 5 min.), the SERCOS bus is shut down, making any further use of the affected controller impossible.

- The number of license points on the compact flash card of the PacDrive controller is not sufficient.
- ► Check the number of required licensing point based on the Licensing parameter in the control configuration.

333 Fatal error receiving encoder data

aV00.22.00 or higher
Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

In the encoder network, a fatal error occurred while distributing the encoder positions.

Ext. diagnosis: "Dupl. Obj."

- Multiple initialization of object (SYN_DIN, SYN_DOUT).
- ► -

Ext. diagnosis: "Int.Err=-xxx"

- Internal error code.
- ► -

Ext. diagnosis: "SyncLost"

- Synchronization was lost while the object (SYN_DIN, SYN_DOUT) was active.
- ► -

Ext. diagnosis: "No Data: xxx"

- The number of data sets (xxx) that was not received sequentially exceeds the limit specified in DataCycleErrorLimit .
- ► -

Ext. diagnosis: "Send error"

- Due to an internal error, the system was unable to send a telegram for 5cycles .
- ► -

334 Error receiving encoder data (warning)

aV00.22.00 or higher
Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6

An error has occurred in the encoder network, while distributing the encoder positions.

Ext. diagnosis: "No Data: xxx"

- A number (xxx) of data sets was not received sequentially. If the number (xxx) of data sets that was not received sequentially exceeds the limit specified in DataCycleErrorLimit the 333 "Fatal error receiving encoder data" (see 8.5.4.34 333 Fatal error receiving encoder data) diagnosis message will be triggered.

► -

335 Fatal synchronization error

V00.22.00 and higher
Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5
Filter type 2 "Diagnosis messages"

A server error in the encoder network occurred while synchronizing the controller system clocks.

Ext. diagnosis: "Sync Init" (Object SYN_M or SYN_S)

- Synchronization master or synchronization slave failed.
  The IP address (SlaveIPAddress) of the sync. module is assigned twice.
- ► Check the **SlaveIPAddress** parameter of the **sync. module** in the **synchronization master** controller configuration.

Ext. diagnosis: "SercosPhase xxx"

- The SERCOS ring is not in phase 4.
- ► SERCOS bus in phase 4 "booted".

Ext. diagnosis: "Dupl. MasterID"

- The set MasterID is already being used by another **synchronization master** in the same network.
- ► Change the **MasterID**.

Ext. Diagnosis: "ProtVer xxx"

- The protocol version of the **synchronization master** does not match the protocol version of the **synchronization slave**.
- ► Use compatible versions of software for the controllers.
- ► Contact your ELAU representative.

Ext. Diagnosis: "Ping Master"

- The **synchronization master** failed to respond to a ping.
- ► Check the Ethernet connection to the **synchronization master**.

Ext. Diagnosis "Dupl. Slave IP" (object SYN_MOD)

- The IP address (SlaveIPAddress) of the sync. module is assigned twice.
- ► Check the **SlaveIPAddress** parameter of the **sync. module** in the **synchronization master** controller configuration.

Ext. Diagnosis: "SlaveCycleTime"

- SlaveCycleTime is not a multiple of the SERCOS cycle time.
- ► Adjust the parameter **SlaveCycleTime** or **SERCOS cycle time**.

Ext. diagnosis: "Wrong config" (object SYN_MOD)

- The addressed **synchronization slave** is not configured properly or is not responding.
- ► Checks the confirmation of the **synchronization slave** (e.g. same CycleTime).
- ► Check the TCP/IP connection **synchronization master** to **synchronization slave**.

Ext. diagnosis: "Wrong config" (object SYN_S)

- The SERCOS cycle time differs on **synchronization master** and **synchronization slave** or the **synchronization slave** configuration cannot be sent.
- ► Adjust the #2178#] CycleTime parameter of the **synchronization master** or the **synchronization slave**.

Ext. diagnosis: "Wrong State"

- The addressed **synchronization slave** is in an error state.
- ► Acknowledge the error in the **synchronization slave**.

Ext. diagnosis: "No DataOut"

- No sync. encoder output has been configured or activated.
- ► Check the PLC configuration.
- ► Activate the **sync. encoder output** if necessary (parameter Enable).

Ext. diagnosis: "No Module"

- No **sync. module** or **sync. encoder input** has been configured or activated.
- ► Check the PLC configuration.
- ► Activate the **sync. module** or the **sync. encoder input** if necessary. (**Sync. module** parameter Enable or **sync. encoder input** parameter Enable).

Ext. diagnosis: "Sync Err"

- The **synchronization slaves** are unable to synchronize with the **synchronization master**.
  The Ethernet (see parameter SyncQuality) and/or the CPU load (see parameter AvailableLoad) is too high.
- ► Check the Ethernet connection.
- ► Optimize the IEC project to reduce the CPU load.

Ext. diagnosis: "No Sync: xxx"

- The number of sequential synchronization telegrams (xxx) which were not received exceeded the number specified in SlaveCycleErrorLimit.
  The Ethernet (see parameter SyncQuality) and/or the CPU load (see parameter AvailableLoad) is too high.
- ► Check the Ethernet connection.
- ► Optimize the IEC project to reduce the CPU load.
- ► Increase the **SlaveCycleErrorLimit**.

Ext. diagnosis: "DataReady Err"

- Either the **sync. encoder outputs** are unable to configure the **sync. encoder inputs** or a data error has occurred while the system is running.
- ► Check parameter Diagcode of the **sync. modules** to receive more detailed information about the source of the error.

Ext. diagnosis: "DataEnable Err"

- Not all **sync. encoder outputs** and **sync. encoder inputs** are ready to exchange data.
- ► Check parameter Diagcode of the **sync. modules** to receive more detailed information about the source of the error.

Ext. diagnosis: "Wrong IP Add"

- The **SlaveIPAddress** parameter is not set.
- ► Contact your ELAU representative.

Ext. diagnosis: "Err xxx"

- Internal error code
- ► Contact your ELAU representative.

336 Synchronization error (warning)

aV00.22.00 or higher
Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6

A fatal error has occurred in the encoder network, while synchronizing the controller system clocks.

Ext. diagnosis: "No Sync: xxx"

- More than half of the synchronization telegrams (xxx) specified in SlaveCycleErrorLimit have not been received sequentially. If more than half of the synchronisation telegrams specified in the **SlaveCycleErrorLimit** have not been received sequentially, the335 "Fatal synchronization error" (see 8.5.4.36 335 Fatal synchronization error) diagnosis message will be triggered.
- ► -

337 Insufficient system memory to create DynIECData

aV00.22.00 or higher
Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4
Filter type 1 "general system messages"

The dynamic memory area, which was specified with the DynIECDataSize parameter, could not be reserved due to insufficient memory (RAM). During IEC program start, a check will be performed to determine if there is at least 4MB of available memory after the dynamic memory area is reserved (also see the Memoryfreeparameter).

- The dynamic memory area to be reserved is too high.
- ► Reduce the **DynIECDataSize** parameter.

338 UPS accu error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

The battery is not sufficiently charged.

Ext. diagnosis: "State = 2"

- The PacDrive controller has been switched off for too long.
- ► Switch on the PacDrive controller.
- ✓ The battery will be charged automatically when the PacDrive controller is on.

- The UPS has been operating in the battery mode (State = 3) for an extended period.
- ► Check the supply voltage.
- ► Switch on the PacDrive controller if it is off.
- ✓ The battery will be charged automatically when the PacDrive controller is on.

- The battery capacity is insufficient due to aging.
- ► Contact your ELAU representative.

339 UPS active - system temperature too high

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

The temperature in the PacDrive controller is too high.

Ext. diagnosis: "State = 6"

- Ambient temperature too high.
- ► For further details, please refer to the technical data on the PacDrive controller (see operating instructions).

8.5.5 4xx "IEC-Task" diagnosis messages

400 IEC diagnosis message class 2

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

A diagnosis message from the IEC program has been triggered with the . DiagMsgWrite() function.

- The error was triggered by the IEC program.
- ► See description of your IEC program. It is possible to display an additional error text with the DiagMsgWrite() function.

401 IEC diagnosis message class 3

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 3

A diagnosis message from the IEC program has been triggered with the . DiagMsgWrite() function.

- The error was triggered by the IEC program.
- ► See description of your IEC program. It is possible to display an additional error text with the DiagMsgWrite() function.

402 IEC diagnosis message class 4

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A diagnosis message from the IEC program has been triggered with the . DiagMsgWrite function.

- The error was triggered by the IEC program.
- ► See description of your IEC program. It is possible to display an additional error text with the DiagMsgWrite() function.

403 IEC diagnosis message class 5

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

A diagnosis message from the IEC program has been triggered with the . DiagMsgWrite() function.

- The error was triggered by the IEC program.
- ► See description of your IEC program. It is possible to display an additional error text with the DiagMsgWrite() function.

404 IEC diagnosis message class 6

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6

A diagnosis message from the IEC program has been triggered with the . DiagMsgWrite() function.

- The error was triggered by the IEC program.
- ► See description of your IEC program. It is possible to display an additional error text with the DiagMsgWrite() function.

405 IEC diagnosis message class 7

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 7

A diagnosis message from the IEC program has been triggered with the . DiagMsgWrite() function.

- The error was triggered by the IEC program.
- ► See description of your IEC program. It is possible to display an additional error text with the DiagMsgWrite() function.

8.5.6 5xx "SERCOS / realtime" diagnosis messages

500 SERCOS slave with duplicate address

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1

While booting the SERCOS bus in phase 3, the addresses of the detected SERCOS slave are checked. The system detects any multiple address assignments. This function, however, must by supported by the SERCOS slaves. ELAU slaves (MC-4, SCL and PS-4) support this function in V00.15.00 or higher.

- A SERCOS slave address has been assigned to the SERCOS slaves twice.
- ► Check the rotary switch settings on the SERCOS slaves.

Meaning in versions below V00.15.00:
A SERCOS slave address has been assigned more than once in the control configuration. The DiagExtCode parameter displays the address that has been assigned multiple times. If the address is displayed once, it has been assigned twice; if it is displayed twice, it has been assigned three times, and so forth.

- A SERCOS slave address has been assigned more than once in the control configuration.
- ► Find the double-assigned address in the DiagExtCode parameter.
- ► Check and adjust the RealTimeBusAdr parameter in the control configuration.

501 SERCOS slave not found

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1

A SERCOS slave specified in the control configuration is not detected in the SERCOS bus.

- SERCOS slave not present in the SERCOS bus.
- ► Connect the SERCOS slave to the SERCOS bus
  or remove the SERCOS slave from the control configuration or parameterize it as avirtual device..

- SCL-055 motors are connected at the PacDrive controller. The SCL-055 motors in the PacDrive PD-8 box are not connected properly.
- ► Check the connection of the SCL-055 motors in the PacDrive PD-8 box. Simply placing jumpers on the desired terminals will not resolve the problem. Slaves must not be inserted into the following SERCOS slot.
  In addition, follow the notes in the "SCL" and "PS-4 and PD-8" operating instructions.

502 Ring not closed

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1

The SERCOS ring is not closed. The result is a longer interruption (>100 ms) of the ring.

You can detect whether the interruption is still present using Light diode "bus err" (see 8.3 "bus err" LED) and the RingStatus parameter.

If the interruption is eliminated and the SERCOS bus is at least in Phase 2, then the error source can be defined using the **SERCOS Firmware Assistant** in the data view **System diagnosis** > **SERCOS configuration** and SERCOS-Topology.

- Signal over the SERCOS fiberoptic conductor is incorrect.
- ► Check Intensity setting in the PacDrive controller and PacDrive servo amplifier.
- ► Check wiring (see parameter RingStatus).

- A device in the SERCOS ring is switched off or was reset.
- ► Check the power supply (24 V) of the device.
- ► Switch on the device.

- **SCL-055** motors are connected at the PacDrive controller. The **SCL-055** motors are not connected properly in the PacDrive **PD-8** box.
- ► Check the connection of the **SCL-055** motors in the PacDrive **PD-8** box. Simply placing jumpers on the desired terminals will not resolve the problem. Slaves must not be inserted into the following SERCOS slot.
  Please refer to the notes provided in the "**SCL**" and "**PS-4** and **PD-8**" operating instructions.

503 Error in parameter channel

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A transfer error has occurred in the SERCOS bus during operation. Additional information will be stored in DiagExtCode .

DiagExtCode	Meaning
ST-Err:xxx	Service transfer error
ST Timeout	Timeout during service transfer

DiagExtCode	Meaning
ST Any	Other service transfer error
ST 99	Error while processing reset ZK1
ST 99 ChangeBit	Error while processing reset ZK1; change bit was not set or protocol error
no SYNC	Communication synchronization with slave disrupted.

- DiagExtCode = no SYNC
  There are SERCOS slaves (MC-4) with a firmware version below V00.15.00 in the loop that are not responding as real devices. If this occurs during the phase startup of the SERCOS bus, a fatal error will be triggered that cancels the phase startup.
- ▶ If there are SERCOS slaves (MC-4) with a firmware version below V00.15.00 that have not responded as real devices, the SERCOS address on the device must be set to zero.

- EMC problem
- ▶ Check the electrical environment.

- Hardware problem with a SERCOS slave (e.g. servo amplifier MC-4) or a SERCOS master (e.g. PacDrive controller Max-4).
- ▶ Contact your ELAU representative.

504 Read cycle overflow

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The transfer of the actual position of the axes (servo amplifiers) to the PacDrive controller occurred too late. The actual values of the next SERCOS cycle have already been read. The actual velocity provided for the IEC program may be incorrect.

- SERCOS bus is overloaded.
- ▶ Increase the CycleTime parameter in the control configuration.

- One or more SERCOS slave have been switched off and therefore no longer supply data to the SERCOS bus.
- ▶ Switch on SERCOS slave.

505 Single SERCOS error (MASTER)

Diagnosis class (see 8.1 Diagnosis Classes) (default): 6

A check sum error on the SERCOS bus has been detected. The data (target and actual position) of the last cycle will be used again.

- Signal over the SERCOS fiberoptic conductor is incorrect.
- ▶ Check the intensity setting in the PacDrive controller and PacDrive servo amplifier.
- ▶ Check the fiberoptic conductor.

- EMC problems.
- ▶ Check the wiring.

- SCL-055 motors are connected at the PacDrive controller. The SCL-055 motors in the PacDrive PD-8 box are not connected properly.

► Check the connection of the SCL-055 motors in the PacDrive PD-8 box. Simply placing jumpers on the desired terminals will not resolve the problem. Slaves must not be inserted into the following SERCOS slot.
In addition, follow the notes in the "SCL" and "PS-4 and PD-8" operating instructions.

506 Fatal SERCOS error (MASTER)

Diagnostic class (see 8.1 Diagnosis Classes) (Default): 1

An error was detected in two successive cycles when receiving data on the SERCOS bus. The SERCOS bus was shut down. For firmware versions earlier than V00.15,00 it is necessary to reset the PacDrive controller to start the SERCOS bus.

⚠ CAUTION

Position loss due to serious SERCOS bus error!
Property damage possible!
Due to the erroneous acknowledgement of diagnostic message 506 "Serious SERCOS error (MASTER)", without restarting the controller, loss of position of the axes and physical encoder (SinCos, incremental encoder) from V00.15.00 is possible.
- Only acknowledge diagnostic message if the re-initialization or referencing of the system by the IEC program has been ensured.
- The capability to acknowledge the diagnostic message can be switched off with the function DiagNoQuitSet().
- Potentially use functions SysReset() or PrgResetAndStart().

- DiagExtCode = RFr or RFlr (see 8.5.1.51 052 Extended SERCOS diagnosis (MASTER))
  Break in control voltage (24V DC) has occurred. Diagnostic message 134 "External 24V power supply too low" (see 8.5.2.35 134 External 24V power supply too low) may still be entered in the message logger (if it was still possible to transfer it via the SERCOS bus).

► Check control voltage (also refer to device's technical information).

- DiagExtCode = RFr (see 8.5.1.51 052 Extended SERCOS diagnosis (MASTER)) during phase start up
  There are SERCOS slaves (MC-4) with a firmware version earlier than V00.15.00 in the ring that are not addressed as real devices. The result is a serious error during phase start up of the SERCOS bus, interrupting the phase start up.

► For SERCOS slaves (MC-4) with a firmware version earlier than V00.15,00 that are not being addressed as real devices, the SERCOS address must be set to 0.

- SCL-055 motors are connected to the PacDrive controller. The connection of the SCL-055 motors in the PacDrive PD-8 box is not correct.

► Check the connection of the SCL-055 motors in the PacDrive PD-8 box. It is not enough to place the jumpers on the desired terminations. No nodes to be plugged into the following SERCOS plug-in position.
Also observe the information outlined in the "SCL" and "PS-4 and PD-8" operating manuals.

507 Write cycle overflow

Diagnosis class (see 8.1 Diagnosis Classes) (default): 4

The transfer of the target position to the SERCOS bus occurred too late. The previous target positions may have been transferred twice. This results in a velocity jump in the drives (see RTBWriteResparameter).

- SERCOS bus is overloaded.
- ► Increase the CycleTime parameter in the control configuration.

- The real-time process is overloaded.
- ► Reduce the number of objects with real-time tasks (e.g. virtual axes, virtual encoders, logical encoders, sum encoders, ...).

- One or more SERCOS slaves have been switched off and therefore no longer supply data to the SERCOS bus.
- ► Switch on SERCOS slave.

508 SERCOS run-up-error

Diagnosis class (see 8.1 Diagnosis Classes) (default): 1

A system error has occurred.

- Virtual SERCOS slaves are specified in the control configuration although the slaves are physically connected on the SERCOS bus.
- ► Check the RealTimeBusAdr parameter of the SERCOS slaves in the control configuration.

- There are more SERCOS slaves in the loop than specified in the control configuration.
- ► Check the number of SERCOS slaves in the control configuration.
- ► Check and RealTimeBusAdr parameter in the control configuration.
- ► Remove the SERCO slave from the loop or set the address on the device to zero.

- SCL-055 motors are connected at the PacDrive controller. The SCL-055 motors in the PacDrive PD-8 box are not connected properly.
- ► Check the connection of the SCL-055 motors in the PacDrive PD-8 box. Simply placing jumpers on the desired terminals will not resolve the problem. Slaves must not be inserted into the following SERCOS slot.
  Please refer to the notes provided in the "SCL" and "PS-4 and PD-8" operating instructions.

- **Ext. diagnosis: "no telegram"**
  If the connection is poor, a loop interruption may not have been detected yet. However, the transfer quality on the BUS may be so bad that no telegrams can be transmitted. As a result, any startup from phase 0 will be cancelled without a diagnosis message. The message logger then shows that the change from phase 0 to phase 1 was cancelled with internal error code -483.
- ► Check the intensity setting for the SERCOS interface.
- ► Check the SERCOS bus wiring.
- ► Check the setting of the MaxPhysicalSlavesparameter.

- **Ext. diagnosis: "SemDPM-Timeout"**
  A synchronization error occurred during phase start up.
- ▶ Contact your ELAU representative.

509 Unsupported FW-version

Diagnosis class (see 8.1 Diagnosis Classes) (default): 4

The firmware version of the SERCOS slave is incorrect.

- The firmware version of the SERCOS slaves (MC-4, SCL, PS-4, ...) is higher than the firmware version of the PacDrive controller in the first 4 positions.
- ▶ Update the PacDrive controller firmware or import an older firmware version into the SERCOS slave.

- **Ext. diagnosis = Vxx.yy.zz BLD**
  The SERCOS slave is in bootloader mode. The version of the bootloader is displayed in the message logger under **Ext. diagnosis**. The SERCOS slave can also be found using the information on the **object** and **instance** provided in the message logger.
- ▶ Disconnect the programming cable from the SERCOS slave.
- ▶ Reset the SERCOS slaves.
- ▶ Acknowledge the diagnosis message.
- ✓ The SERCOS bus is running in phase 4.

510 EZB IRQ lost

Diagnosis class (see 8.1 Diagnosis Classes) (default): 4

The interrupt of the SERCOS bus has not been received in at least twice the cycle time . This diagnosis message normally occurs at the same time as other diagnosis messages (504 Read cycle overflow (see 8.5.6.5 504 Read cycle overflow) ... 507 Write cycle overflow (see 8.5.6.8 507 Write cycle overflow)).

- The problem occurs when the system shuts down. The 24 V control voltage of the SERCOS slave is removed faster than the 24 V control voltage of the PacDrive controller.
- ▶ Check the wiring or connection diagram.

- Wiring error: The fiberoptic conductor of the SERCOS bus is damaged.
- ▶ Replace the fiberoptic conductor.

- A SERCOS slave has failed.
- ▶ Check the SERCOS slave.

511 CPU time overflow

Diagnosis class (see 8.1 Diagnosis Classes) (default): 2

The real-time process is overloaded (CycleLoad >95 %). The DiagExtCode parameter displays the measured load as ‘Load = xxx%’ with xxx indicating the load in %.

NOTE

After detecting the error, the actual and target values for the encoders, generators and axes will no longer be processed in the real-time process. As a result, the "target and actual values" parameter of the axes will show invalid values.

- Too many objects are specified in the control configuration.
- ▶ Increase the CycleTime parameter of the SERCOS interface in the control configuration.

512 SERCOS wrong device type

Diagnosis class (see 8.1 Diagnosis Classes) (default): 1

While starting up the SERCOS bus in phase 2, the type of the detected SERCOS slave (MC-4, SCL, PS-4) will be checked based on the slave specified in the control configuration. If no match is found, the SERCOS bus phase startup will be cancelled. The SERCOS address and the detected type will be entered in the extended diagnosis.

NOTE

Multiple address assignments may also exist. If this is the case, at least two SERCOS slaves have the same address.

- The SERCOS slave address (RealTimeBusAdr) on the SERCOS slave (MC-4, SCL, PS-4) was not set correctly.
- ▶ Check the address setting on the SERCOS slave that is displayed in the diagnosis message.
- ▶ Check if the address setting on the SERCOS slave matches the address setting in the control configuration (RealTimeBusAdr).

- The SERCOS address (RealTimeBusAdr) has not been specified correctly in the control configuration.
- ▶ Check the RealTimeBusAdr parameter of the device displayed in the diagnosis message.

513 Download result

Diagnosis class (see 8.1 Diagnosis Classes) (default): 4
Filter type 2 "Diagnosis messages"

An error has occurred during the program-controlled firmware download.

- **Ext. diagnosis = SI <SERCOS Address> Err -479**
  An incorrect device type is indicated in the configuration file (e.g. a **PS-4** firmware for a **MC-4**). This diagnosis message is generated for each SERCOS slave.
- ▶ Adjust the configuration file.

- **Ext. diagnosis = SI <SERCOS Address> Err -495**
  The "Download Mode" in the configuration file is specified as "upgrade" (or "downgrade") and the current firmware version is higher (or lower) than the firmware version that is to be programmed.
- ▶ Check the firmware version of the SERCOS slave.

► Adjust the configuration file.

514 Error download configuration file

Diagnosis class (see 8.1 Diagnosis Classes) (default): 4

516 SERCOS wrong device position

Diagnosis class (see 8.1 Diagnosis Classes) (default): 1

While starting up the SERCOS bus at the end of phase 3, the assignment of the SCLs to the PS-4 is checked. All SCLs that have been assigned a specific PS-4 power supply in the control configuration must be physically connected with that PS-4. If an assignment error occurs, the 516 "SERCOS wrong device position" diagnosis message will be displayed.
The message appears for the affected SCL. The DiagExtCode displays the name of the PS-4 that actually should be assigned to the SCL.

- The addresses of the integrated SCL servo drive have been incorrectly set via the rotary switch on the device.

► Check the address settings on the SCL.

- The addresses of the PS-4 power supply have been incorrectly set via the rotary switch on the device.

► Check the address settings on the PS-4.

- The RealTimeBusAdr parameter in the control configuration contains incorrectly specified PS-4 and/or SCL addresses.

► Check the RealTimeBusAdr parameter in the control configuration.

517 Multiple used RealTimeBusAdr

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1

A SERCOS address (RealTimeBusAdr) has been assigned more than once in the control configuration. A check is performed while preparing the SERCOS phase 1. The boot procedure of the SERCOS bus will be cancelled. The DiagExtCode parameter and the ext. diagnosis in the message logger display the address that have been assigned more than once.

- A SERCOS address has been assigned more than once in the RealTimeBusAdre parameter in the control configuration.

► Check the RealTimeBusAdr parameter in the control configuration.

518 Too many real SERCOS Slaves

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The number of real SERCOS slaves is too high.

Ext. diagnosis: HW <maximum number of SERCOS slaves on controller>/<number of configured SERCOS slaves>

- Limited by the controller type:
  Before exiting the SERCOS phase 0, the number of configured real SERCOS slaves in the control configuration will be checked. The number must be smaller or equal to the licensed number for the PacDrive controller. If this number is

exceeded, the startup will be cancelled. The extended diagnosis shows the licensed and the configured number together with the "HW" prefix.
- ▶ Check the PacDrive controller type by referring to the type plate.

Ext. diagnosis: BUS t = <cycle time overrun>µs

- The communication parameters of the SERCOS slave are queried in the SERCOS phase 2. Together with the settings of the SERCOS master, the time slots for the cyclical telegram traffic will be determined and set. The BaudRate and CycleTime parameters determine the available BUS bandwidth. If the bandwidth is insufficient, the startup will be cancelled with the 518 "Too many real SERCOS Slaves" diagnosis message. The extended diagnosis shows the time by which the cycle time has been exceeded as a negative value.
- The number of SERCOS slaves (MC-4, PS-4, SCL) for the cycle time is too high.
- ▶ Check the cycle time.
- ▶ Check the BaudRate.

Ext. diagnosis: SercDrv <number of licensed SERCOS SercDrv slaves>/<number of configured SERCOS SercDrv slaves>

- Limited by the hardware configuration (licensing):
  Before leaving the SERCOS phase 0, the number of configured real SERCOS SercDrv slaves in the control configuration will be checked. The number must be smaller or equal to the licensed number for the PacDrive controller. If this value is exceeded, the startup will be cancelled. The extended diagnosis shows the licensed and the configured number together with the "SercDrv" prefix.
- ▶ Check the PacDrive controller type.
- ▶ Contact your ELAU representative.

8.5.7 6xx "master encoder" diagnosis messages

600 Serial interface problem

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

An error has occurred while exchanging data with the SinCos master encoder via the serial interface of the encoder.

⚠ CAUTION
InitPosition and EncoderPosition are possibly incorrect. Damage may result from a non-referenced machine. ▪ Reset the PacDrive controller after you have corrected the error.

- Wiring error: The encoder cable is not plugged in correctly or is defective.
- ▶ Check the encoder cable and replace if necessary.
- ▶ Reset the PacDrive controller.

- Data is exchanged using the encoder's serial interface during the functions PhyEncGetPosition(),PhyEncResetEncoder() and PhyEncSetPosition(). The actual data exchange is performed by the system task (TASK_TYPE_PHY_ENC_JOB_Server). If the functions are active, this task must query the serial interface on a regular basis (usually<2ms). Insufficiently allocated processing time may result in data loss (diagnosis message 600). The TASK_TYPE_PHY_ENC_JOB_Server system task runs at IEC priority 5

(same as system priority 225). If the above functions in the IEC tasks are called with a priority of 1 to 4, this problem may result when the processing requirements are too high.

- ► Increase the priority of the system task.
- ► Reset the PacDrive controller

Example:
The PhyEncGetPosition() function is triggered from an IEC task with IEC priority of 4. The IEC task normally requires 2.5ms for processing. Increase the priority of the system task from 225 (or IEC priority 5) to 224 (IEC priority 4) for example.
SetTaskPriority(ITaskType:=TASK_TYP_PHY_ENC_JOB_Server, IPriority:=224);

- Hardware error: The SinCos encoder is defective.
- ► Replace the encoder.
- ► Reset the PacDrive controller

- Hardware error: The SinCos encoder interface in the controller is defective.
- ► Replace the controller.

601 Encoder track error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

Unable to receive analog data from the SinCos master encoder.

⚠ CAUTION
Hardware encoder error!
Position loss of the master encoder
- Acknowledge the diagnosis message only after the re-initialization or referencing of the system is secured by the IEC program.
- If necessary, use the SysReset() or the . PrgResetAndStart() function.

- Wiring error: The encoder cable is not plugged in correctly or is defective.
- ► Check the encoder cable and replace if necessary.

- Hardware error: The SinCos encoder is defective.
- ► Replace the encoder.

- Hardware error: The SinCos encoder interface in the controller is defective.
- ► Replace the controller.

8.5.8 7xx "field buses and expansion module" diagnosis messages

700 CAN layer2 driver error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

Unable to start the driver for the CANopen module.

- No CAN module in the PacDrive controller.
- ► Order and install the CAN module.

- Incorrect I/O address or interrupt setting.

► Check the I/O address .
► Check the interrupt setting .

▪ Hardware error: CAN module defective.
► Replace the CAN module.

▪ Hardware error: Controller is defective.
► Replace the controller.

701 CAN layer2 init error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

Initialization has failed.

▪ CAN module overloaded; unable to process command messages fast enough.
► -

▪ Hardware error: CAN module defective.
► Replace the module.

702 CAN layer2 single error detected

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A send or receive error has occurred.
Meaning of ext. diagnosis:
displays the pending register information at the time the error occurred.
Structure: eXXsXXrXXtXX (XX indicates a hexadecimal number)
e error register (error code capture register)

Bit 7	Bit 6
0	0: Bit error
0	1: Format error
1	0: Stuff error
1	1: Other error

Bit 5
0: Send error
1: Receive error

Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
0	0	0	1	1	Start of frame
0	0	0	1	0	ID.28 to ID.21
0	0	1	1	0	ID.20 to ID.18
0	0	1	0	0	Bit SRTR
0	0	1	0	1	Bit IDE
0	0	1	1	1	ID.17 to ID.13
0	1	1	1	1	ID.12 to ID.5
0	1	1	1	0	ID.4 to ID.0
0	1	1	0	0	Bit RTR
0	1	1	0	1	Reserved bit 1
0	1	0	0	1	Reserved bit 0

Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
0	1	0	1	1	Data length code
0	1	0	1	0	Data field
0	1	0	0	0	CRC sequence
1	1	0	0	0	CRC delimiter
1	1	0	0	1	Acknowledge slot
1	1	0	1	1	Acknowledge delimiter
1	1	0	1	0	End of frame
1	0	0	1	0	Intermission
1	0	0	0	1	Active error flag
1	0	1	1	0	Passive error flag
1	0	0	1	1	Tolerate dominant bits
1	0	1	1	1	Error delimiter
1	1	1	0	0	Overload flag

Table 8-7: Bit 4 to Bit 0 indicate the position of the error.

s Status Register (see Status parameter)
r Receive Error Counter (see Status parameter)
t Send Error Counter (see Status parameter)

- Bit Error + Data Length Code.
  Two nodes are using the same identifier or COB-ID.
- ► Check the identifier or COB-ID.

- Bit Error + Identifier
  Intermittent connection error to receiver.
- ► -

- Stuff Error + Identifier
  Dominant signal level due to external interference.
- ► -

- Format error + Acknowledge delimiter
  Critical bus time setting (Baudrate) or bus length.
- ► -

Ext. diagnosis = count=xx/yy

xx: Contains the value of the ErrorCount at the time the error occurred.
yy: Contains the value of the ErrorOffCount parameter at the time the error occurred.
The GlobalError parameter is set to Bit 4.

- Bus error.
- ► -

703 CAN layer2 errors reach warning limit

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The number of send or receive errors specified in the warning limit register has been exceeded.

Meaning of ext. diagnosis: The system displays the pending register information at the time the error occurred.
Structure: sXXrXXtXX
s Status register (see Status)
r Receive Error Counter (see Status parameter)
t Send Error Counter (see Status parameter)

704 CAN layer2 switched passive

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

128 send or receive errors have occurred. In passive mode, no CAN messages are acknowledged and no error messages are sent to the bus.

Meaning of ext. diagnosis: The system displays the pending register information at the time the error occurred.
Structure: sXXrXXtXX
s Status register (see Status)
r Receive Error Counter (see Status parameter)
t Send Error Counter (see Status parameter)

705 CAN system error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

An internal error in the CAN module has occurred. The type of error is specified in more detail in the ext. diagnosis.

- **Ext. diagnosis = msg lost=XXX:**
  The control firmware was unable to retrieve the command or status messages from the CAN module fast enough. As a result, the buffer has overflowed and XXX messages have been lost.
  ▶ Contact your ELAU representative.

- **Ext. diagnosis = fmsg lost=XXX:**
  The control firmware was unable to retrieve the layer2 messages from the CAN module fast enough. As a result, the buffer has overflowed and XXX messages have been lost.
  ▶ Contact your ELAU representative.

- **Ext. diagnosis = module overload:**
  CPU on CAN module was unable to read the data from the CAN bus fast enough and messages have been lost as a result.
  ▶ Contact your ELAU representative.

- **Ext. diagnosis = module int lost:**
  CPU on CAN module was unable to read the CAN messages (intended for CAL/CANopen) from the bus fast enough. No messages for CAL/CANopen have been defined for layer 2. Error is not permitted to occur with the CAN layer 2 module.
  ▶ Contact your ELAU representative.

- **Ext. diagnosis = mod queue out:**
  CPU on CAN module was unable to read the CAN messages send for CAL/CANopen fast enough. No messages for CAL/CANopen have been defined for layer 2. Error is not permitted to occur with the CAN layer 2 module.
  ▶ Contact your ELAU representative.

- **Ext. diagnosis = mod error:**
  Event error of the CAN module not specified in more detail. Default branch event error evaluation. Should not occur.
- ► Contact your ELAU representative.

706 CAN layer2 errors below warning limit

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 8

The number of send or receive errors specified in the warning limit register has been exceeded. Sending or receiving functioning again.

707 CAN layer2 switched active

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 8

The number of send or receive errors (128) has been exceeded. The CAN module is running again in active mode. Sending or receiving functioning again.

Meaning of ext. diagnosis: The system displays the pending register information at the time the error occurred.
Structure: sXXrXXtXX
s Status register (see Status)
r Receive Error Counter (see Status parameter)
t Send Error Counter (see Status parameter)

720 No module found

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 4

Module detection could not be found or it is not possible to update the field bus firmware.

- The firmware file on the flash disk (or on the hard disk of the P600) is not available or not correct.
- ► Check to see if there is a valid firmware file available.

- Optional module in the controller not available.
- ► Install module in controller or send controller in to be converted.

- An optional module was entered in the PLC configuration that is not available.
- ► Check PLC configuration.

- A **phys. encoder** (SinCos encoder) is entered in the PLC configuration at **BT-4/ENC1** but no **phys. encoder** is recognized at plug connector **BT-4/ENC1**.
- ► Put incremental encoder cable on **BT-4/ENC1** connector.
- ► Check encoder cable.

- The I/O address is incorrectly set.
- ► Check I/O address.

- Hardware error: Module defective.
- ► Replace module.

- Hardware error: Controller defective.
- ► Replace controller.

721 Module not ready

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The module does not respond after initialization by the controller.

- Module defective.
- ▶ Replace module in controller.

- **Ext. diagnosis = no answer:**
  Watchdog monitoring for the (Profibus) module has triggered. The module does not respond within the preset monitoring time (see default configuration).
- ▶ Replace module in controller.

- **Ext. diagnosis = FPGA defect:**
  Unable to program FPGA. The module is not ready.
- ▶ Replace module in controller.

- **Ext. diagnosis = FPGA PinOut:**
  The FPGA firmware file does not match the FPGA pinout. This may result in damage to the module.
- ▶ Via FTP, copy the correct FPGA firmware to the flash disk of the controller and restart the controller.

- **Ext. diagnosis = FPGA prg fail:**
  Unable to program the FPGA. The firmware is not compatible with the module.
- ▶ Via FTP, copy the correct FPGA firmware to the flash disk of the controller and restart the controller.

- **Ext. diagnosis = no FPGAfl open:**
  Unable to open the FPGA firmware file. The flash disk may be defective.
- ▶ Replace the flash disk.

- **Ext. diagnosis = def FPGA-head:**
  The header in the firmware file is not correct.
- ▶ Via FTP, copy the correct FPGA firmware to the flash disk of the controller and restart the controller.

- **Ext. diagnosis = wr FPGA size:**
  The size of the FPGA file is incorrect.
- ▶ Via FTP, copy the correct FPGA firmware to the flash disk of the controller and restart the controller.

- **Ext. diagnosis = no FPGAfile:**
  An FPGA firmware file was not found on the flash disk.
- ▶ Via FTP, copy the correct FPGA firmware to the flash disk of the controller and restart the controller.

- **Ext. diagnosis = RTC is damaged:**
  Unable to set the time of the RealTimeClock in the PN-4 optional module. The diagnosis message cannot be acknowledged.
- ▶ This is due to a problem in a very early hardware version of the PN-4. To correct the error, the PN-4 module must be replaced. The problem has been corrected in hardware code 030033 and higher.
  Workaround:

The DiagNoQuitReset() IEC function can be used to make the diagnosis message acknowledgeable.
Example
DiagNoQuitReset(721);

722 No cyclic telegram

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The exchange of cyclical data was interrupted.

NOTE

No error is displayed when the connection between the PROFIBUS-DP Slave und PROFIBUS-DP master is interrupted if the response monitoring in the slave was shut off by the master. This means that diagnosis code 722 is not triggered.

- The master interrupts the sending of cyclical data.

▶ Check the master.

- Cable fault.

▶ Check the wiring.

- The slave address has been assigned twice in the network.

▶ Check the configuration.

723 No profibus configuration data

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

This diagnosis message only occurs in the bootphase of the PacDrive controller or with bus enable . No configuration file was found on the flash disk of the PacDrive controller.
A DiagExtCode may be generated.

- **Database:** Unable to delete the SyCon configuration database on the Profibus card software.
- **bad load:** No configuration file was found on the flash disk of the controller.
- **bad sldata:** The slave data of the configuration file is incorrect. Should occur together with the 730 "Bad master parameter data" (see 8.5.8.16 730 Bad master parameter data) diagnosis message. If not, the incorrect configuration will result in the Profibus card resetting.
- **bad madata:** The master bus data of the configuration file is incorrect. Should occur together with the 730 "Bad master parameter data" diagnosis message. If not, the incorrect configuration will result in the Profibus card resetting.

- Communication problems.

▶ Transfer the control configuration again.

- The slave address has been assigned twice in the network.

▶ Check the configuration.

- Hardware error: Flash disk defective.

▶ Replace the flash disk.

- Hardware error: Controller is defective.
- ► Replace the controller.

724 no I/O area detected

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The field bus server(s) did not detect an IEC I/O area. The I/O area is prepared while loading the IEC program.

- Subsequent error to diagnosis message 204 "IEC program cannot be loaded".
- ► See 204 "IEC program cannot be loaded" (see 8.5.3.5 204 IEC program cannot be loaded)diagnosis message.

- Libraries in the project were modified or replaced. This can occur in controller versions below V00.16.20.
- ► Reset the controller (EPAS-4: Online > Reset PacDrive Controller).

- A project was transferred with EPAS-4 using a different setting from the MaxNumOfPOUs in the "EPAS-4.ini" file.
- ► Adjust the setting for MaxNumOfPOUs to match your EPAS-R installations. Reset the controller (EPAS-4: Online > Reset PacDrive Controller).

- Defective project.
- ► Reconvert the project by choosing "Project > Fix All" in the EPAS-4 and then "Project > Convert All". Then transfer the project again to the controller and reset the controller (EPAS-4: Online > Resetting the PacDrive Controller).

725 Firmware of the module was replaced

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 7

This message shows that the firmware of a fieldbus module was replaced.
In controller firmware version 00.16.40 or higher, the version of the new fieldbus firmware is displayed in the ext. diagnosis in the message logger.

726 Firmware of the module is incorrect

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

This message shows that the firmware of a fieldbus module is incorrect.

- Firmware download for a fieldbus module via the controller failed.
- ► Repeat the firmware download.

730 Bad master parameter data

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The slave and/or master data of the configuration file are incorrect. The error code specified after "Err=" corresponds to the error code of the ErrorCodeparameter.

- Communication problems when transferring the control configuration from EPAS-4 to controller.
- ► Transfer the controller configuration again.

- Hardware error: Controller or flash disk defective.

► Replace the controller.

731 Automatic bus deactivation

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The Auto Clear Bit in the master is set and at least one slave is not exchanging cyclical I/O data. The error code specified after "Err=" corresponds to the error code of the ErrorCodeparameter.

▪ Slave has been disabled.
► Reactivate slave.

▪ At least one slave is not configured correctly.
► Check the configuration.

▪ Wiring error: Cable fault in bus.
► Check cable.

▪ Wiring error: Incorrect bus topology.
► Check terminals, transmission lines, …

732 Slave not responding

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

Slave with bus address preceded by "S1=" is not exchanging cyclical I/O data. The error code specified after "Err=" corresponds to the error code of the ErrorCodeparameter.
If the Activation parameter is set to "false", then this diagnosis message will not be triggered in V00.20.00 or higher.

▪ Slave has been disabled.
► Reactivate slave.

▪ At least one slave is not configured correctly.
► Check the configuration.

▪ Wiring error: Cable fault in PROFIBUS-DP.
► Check cable.

▪ Wiring error: Incorrect bus topology.
► Check terminals, transmission lines, …

733 Fatal bus error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

Further bus communication is not possible due to a severe bus error.

⚠ CAUTION
No data exchange with bus terminal BT-4 ENC1! Position loss of the master encoder connected to bus terminal **BT-4/ENC1**. ▪ Acknowledge the diagnosis message only after the re-initialization or referencing of the system is secured by the IEC program. ▪ If necessary, use the SysReset() or the . PrgResetAndStart() function.

▪ Wiring error: Incorrect bus topology.
► Check terminals, transmission lines, …

▪ EMC faults.
► Check the wiring and EMC protection.

▪ **Ext. diagnosis = asynchronous:**
A synchronization error has occurred. The TouchProbes on the **BT-4/DIO1** are not working.
► Check the jumper cable that connects the controller to the optional **PN-4** module (in the controller).

▪ **Ext. diagnosis = clock miss:**
A communication error has occurred in PacNet. This may be due to a variety of causes:
- PacNet loop not closed
- PacNet terminating plug is missing
- A module connected to PacNet failed (no power)
► Check the PacNet loop and all the modules in the loop.

734 Bus short circuit detected

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The number of bus short circuits specifed by "count=" was detected.

▪ Slave fault.
► Check the slave device.

▪ EMC problem.
► Check the wiring.

▪ Wiring error: Cable is defective.
► Check the wiring.

735 Reject bus telegrams

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The number of telegrams specified in "count=" was rejected.
One or more telegrams could not be transmitted to the bus. This occurs, for example, when there are no further slaves in the bus, which is confirmed by the telegram.

▪ Wiring error: Cable is defective.
► Check the wiring.

736 No I/O data exchange with slave

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

Slave with bus address preceded by "S1=" is not exchanging cyclical I/O data.

- Slave is not configured correctly.
- ► Check the configuration based on the documentation for the slave.

737 Double IEC address assigned

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The IEC start address for the input or output area was assigned more than once.

DiagExtCode:

- **I Slxxx=Slyyy:** The slaves with the Profibus addresses xxx and yyy have been specified with the same start address for the IEC input data.
- **O Slxxx=Slyyy:** The slaves with the Profibus addresses xxx and yyy have been specified with the same start address for the IEC output data.

- Slaves are not configured correctly.
- ► Check the configuration.
- ► Adjust the addresses manually or select "Addresses automatic" in the properties dialog box of the Profibus master object in the control configuration.

738 Conf. I/O data > permissible IO area

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The maximum IO data size has been exceeded.

DiagExtCode:

- **I D=xxx>yyy:** The maximum input data size of yyy bytes has been exceeded by the configured data size of xxx bytes.
- **O D=xxx>yyy:** The maximum output data size of yyy bytes has been exceeded by the configured data size of xxx bytes.

- Slaves are not configured correctly.
- ► Reduce the IO data of the slave.

739 Double profibus address assigned

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The Profibus Adr=xxx has been assigned twice in a master configuration.

- Slave is not configured correctly.
- ► Check the configuration.
- ► Adjust the addresses manually or select "Addresses automatic" in the properties dialog box of the Profibus master object in the control configuration.

750 CanOpen node does not exist

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The bus will be examined for existing nodes using the default Sdo index 0x1000. This diagnosis message will be triggered if the configuration contains nodes that have not been detected.

Ext. diagnosis:
Displays the node addresses of the nodes that have been configured but not detected on the bus.
Structure: NodeId=xxx
xxx decimal node address

- Node not switched on or ready when the check is performed; node does not permit Sdo access to the index 0x1000; node addresses are not set correctly.
- ► Check the configuration.

- Electrical connection incorrect or defective.
- ► Check the wiring.

751 CanOpen node not configured

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 7

The bus will be examined for existing nodes using the default Sdo Index 0x1000. This diagnosis message will be triggered if nodes are detected that do not exist in the configuration.

Ext. diagnosis:
Displays the node addresses of the detected node that has not been configured.
Structure: NodeId=xxx
xxx decimal node address

- CanOpen node not configured.
- ► Configure or switch off node.

752 No CanOpen EDS file exists

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

Unable to load the COPMAX4.EDS CANopen description file on the flash disk of the controller.

- Description file has not been transferred to the controller or has been deleted.
- ► Transfer the description file to the controller via FTP.

753 Initialisation CanOpen module failed

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

An error has occurred during the initialization phase of the CANopen module.

Meaning of ext. diagnosis:

- **can_open:** Init driver of the can_open call failed.
- **CmsConfig:** Init driver of the CmsConfig call failed.
- **SetHostEndian:** Init driver of the SetHostEndien call failed.
- **InquiryStatus:** Init driver of the InquiryStatus call failed.
- **SSyncToHost:** Init driver of the SsyncToHost call failed.
- **Baudrate:** Init driver of the Baudrate call failed.
- **Termination:** Init driver of the Termination call failed.

- **LsBusOnReq:** init driver of the LsBusOnReq call failed.
- **CalMaster:** Init driver of the CalMaster call failed.
- **IdVersReq:** Init driver of the IdVersReq call failed.
- **LsSwitchBerrReq:** Init driver of the LsSwitchBerrReq call failed.

- Software error.
- ► Contact your ELAU representative.

754 CanOpen emergency message

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A CANopen node has sent an emergency message to the bus.

Meaning of ext. diagnosis:
The system displays the node address, the error code and the error register.
Structure: Nxxx Cxxxx Rxx
N node address decimal CANopen node address
C error code hexadecimal CANopen error code

Error code (hex)	Meaning
00xx	Error reset or no error
10xx	Generic error
20xx	Current
21xx	Current, device input side
22xx	Current, inside the device
23xx	Current, device output side
30xx	Voltage
31xx	Mains voltage
32xx	Voltage inside the device
33xx	Output voltage
40xx	Temperature
41xx	Ambient temperature
42xx	Device temperature
50xx	Device hardware
60xx	Device software
61xx	Internal software
62xx	User software
63xx	Data set
70xx	Additional modules
80xx	Monitoring
81xx	Communication
90xx	External error
F0xx	Additional function
FFxx	Device specific

Table 8-8: Error Code (hex) and meaning

Bit	M/O	Meaning
0	M	Generic error
0	O	Current
0	O	Voltage
0	O	Temperature

Bit	M/O	Meaning
0	O	Communication error (overrun, error state)
0	O	Device profile specific
0	O	Reserved
0	O	Manufacturer-specific

Table 8-9: R error register hexadecimal CANopen error register

Bit: Bit number in error register
M/O: Mandatory/Optional

- See description of the triggering node

► -

- CopMaTriggerEmcy was called by another controller.

► -

755 CanOpen node guarding error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The CANopen master can monitor the individual CANopen slave nodes. While monitoring, the status of the nodes is queried in configurable intervals (Guard Time). If a response is not received within a specified time (Guard Time * Life Time Factor), this diagnosis message will be triggered. The CANopen slave also checks the time between monitoring queries (Guard Time * Life Time Factor) after the first monitoring query is received. No ext. diagnosis is displayed in this case.

Meaning of the ext. diagnosis of the CANopen master:

Structure: Nxxx timeout
N decimal CANopen node address
The displayed node has not responded to a monitoring query within the specified time (Guard Time * Life Time Factor).

Structure: Nxxx toogle bit
N decimal CANopen node address
The displayed node has responded to a query with an incorrect monitoring response. The "toggle bit" has not been sent properly. The correction of this error will not be displayed.

Structure: Nxxx e=xx r=xx
N decimal CANopen node address
e= expected status of hexadecimal CANopen status
r= received status of hexadecimal CANopen node address
Status: DISCONNECTED, INITIALISING0
CONNECTED3
PREPARED4
OPERATIONAL5
PRE_OPERATIONAL7f

The displayed node has responded to a query with an incorrect monitoring response. An unexpected status was received.

- CANopen node has not processed the reset or a configuration has not been sent.

►

- Electrical bus connection faulty or incorrect.

► Check the wiring.

756 CanOpen DPM access timeout

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

Unable to read one or more input application objects.

Meaning of ext. diagnosis:
Displays the size of the non-readable application object.

- Software error; module overload.
- ► Contact your ELAU representative.

757 CanOpen config error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

An error has occurred while configuring the individual CANopen slaves.

Meaning of the ext. diagnosis (Controller MAx-4):
Structure: xxxxSyyzzvvNcc
Upper case characters appear directly.
Lower case characters have the following meanings:

Character	Meaning
xxxx	Cop Index in hex display
yy	Cop SubIndex in hex display
zz	Meaning of Cop Index is displayed as follows: MT: Map entry for send PDO MR: Map entry for receive PDO T: send PDO R: receive PDO ' ': Index has nothing to do with PDO.
vv	Number of the respective PDOs in hex display
cc	Node number in hex display

- CANopen node not reachable via Sdo access (e.g. node still in startup phase); node not available; mapping of application object not permitted (application object not available or mappable); write access to the index is not permitted for this node.
- ►

- Electrical bus connection faulty or interrupted.
- ► Check the electrical connection.

- **Ext. diagnosis: <None>**
  Parameterization error.
- ► See GlobalError parameter (Bit 0 is set).
  Contact your ELAU representative.

- **Ext. diagnosis: Database**
  Message is generated when a hardware error occurs.
- ► Contact your ELAU representative.

Ext. diagnosis: Sl=xx Err=yy
xx: Contains the CANopen bus address of the slave that has configuration data with errors.
yy: Contains the value of the Status parameter at the time the error occurred.

758 Application object size not supported

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The CANopen master provides the specified application objects. If the application objects are configured in the CANopen node configuration with an application object size that is not available, this diagnosis message will be triggered.

Meaning of ext. diagnosis:
Structure: Nxxx Cxxxx Rxx
CID Pdo CobId hexadecimal CopIf (Identifier) of the Pdos in which the application object has been mapped.
S size of the application object of the hexadecimal application object size
N hexadecimal CANopen node address

- Configuration error.
- ► Check the configuration.

759 Application obj. max count limit reached

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

The CANopen master provides the application objects described in the operating manual. If more application objects are configured in the CANopen master configuration than are actually available, this diagnosis message will be triggered.

Meaning of ext. diagnosis:
Structure: Nxxx Cxxxx Rxx
CID Pdo CobId hexadecimal CopIf (Identifier) of the Pdos in which the application object has been mapped.
S size of the application object of the hexadecimal application object size
N hexadecimal CANopen node address

- configuration error.
- ► Check the configuration.

770 Option-modules area exceeded

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

An overlapping of the IO area of the optional module was detected. The DiagExt-Code displays the number code of the type key of the overlapping module.

Example:
DiagExtCode = '3/01 2/02'; i.e. the IO address of the PROFIBUS-DP master module (2/02) is within the IO address area of the DeviceNet slave module (3/01).

- The IO area of the optional module has not been set properly in the controller.
- ► Check the IO area settings based on the operating instructions for the option modules.

771 Double IRQ config of the option-modules

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A double interrupt use by the optional module was detected. The DiagExtCode displays the interrupt that was used twice.

- The interrupt of the optional module has not been set properly in the controller.
- ▶ Check the interrupt settings based on the operating instructions for the option modules.

780 Frequence > 1MHZ

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

The incremental speed to be output was too high.

⚠ CAUTION

Incremental speed too high.
Position loss at the incremental encoder output.
Amplified incremental encoder inputs or systems lose position reference.
- Carry out the referencing of the amplified incremental encoder inputs or systems again.
- Note the causes and troubleshooting measures listed below.

- The speed of the encoder to be simulated is too high.
- ▶ Reduce the speed of the encoder.

- The resolution and/or FeedConstant parameters have not been entered correctly.
- ▶ Check the parameters.

781 No connection to encoder

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

The jumper in the encoder cable connecter to the controller was not detected.
This monitoring function is active in the MAx-4 optional INC-4 optional module when connecting an incremental encoder. The monitoring function for the SinCos encoder is active on the Cx00 and P600 controller.

- Wiring error: Encoder cable to the controller removed.
- ▶ Plug in the encoder cable.

- Wiring error: Encoder cable is defective.
- ▶ Check the encoder cable and replace if necessary.

782 Track error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

A hardware encoder error occurred at the incremental encoder input (**BT-4/ENC1** or incremental encoder module **INC-4**).

⚠ CAUTION
Hardware encoder error! Position loss of the master encoder ▪ Acknowledge the diagnosis message only after the re-initialization or referencing of the system is secured by the IEC program. ▪ If necessary, use the SysReset() or the . PrgResetAndStart() function.

- Wiring error: Encoder cable at the encoder or the encoder input has been removed or is defective.
- ► Check the encoder cable and replace if necessary.
- ► Check the ground connection (shield).

- The encoder / encoder supply or encoder simulation is not ready.
- ► Switch off the default monitoring with the parameter CheckOff
- ► If the encoder or encoder simulation is ready, then activate the monitoring in the IEC program.

- Encoder defective.
- ► Replace the encoder.

785 Hardware defect

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A hardware defect exists.

- **Ext. diagnosis = PIIX Error**
- ► Replace the controller.

- **Ext. diagnosis = EEPROM damag**
- ► Replace the optional PN-4 module.

- **Ext. diagnosis = EEPROM S xxxx**
- ► Replace the optional PN-4 module.

- **Ext. diagnosis = RTC is damaged**
  Unable to set the time of the RealTimeClock in the PN-4 option module.
  This is due to a problem in a very early hardware version of the PN-4. This problem has been removed in hardware code 030033 or higher.
- ► Replace the PN-4 module.

- **Ext. Diagnosis = Ref PowerFail**
  Instance= OutputGroup
  The status of the digital outputs remains unchanged until the supply voltage (connector X1) has fallen to 0 volts. The diagnosis message can be entered in the message log when the controller is switched off, as the voltage drop of the supply voltage causes a Spi error before the CPU detects a power failure.
  Instance= InputGroup
  The digital inputs cannot be evaluated. The diagnosis message can be entered in the message log when the controller is switched off, as the voltage drop of the supply voltage causes a Spi error before the CPU detects a power failure.
- ► Check the supply voltage.

- **Ext. diagnosis = Ref PowerFail**
  Evaluation of the digital inputs in accordance with the en61131-2 type 1 standard is no longer guaranteed. The diagnosis message can be entered in the message log when the controller is switched off, as the voltage drop of the supply voltage causes a Ref PowerFail error before the CPU detects a power failure.
- ▶ Check the supply voltage.

786 Asynchronous to SERCOS bus

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

787 Configuration error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

A configuration error has occurred.

- **Ext. diagnosis = Mtype=xx wrong (xx = detected module)**
  A non-configured module was detected on PacNet. The module cannot be used.
- ▶ Check the configuration of the module in the control configuration.

- **Ext. diagnosis = Mtype=0 wrong**
  No module was found on PacNet.
- ▶ Switch on the control voltage on the module.

- **Ext. diagnosis = M=xx n.res**
  The module with bus address xx repeatedly gives no response. This may be caused by a power failure or a defective module. The module cannot be used.
- ▶ Check the module address on the module.
- ▶ Check the module address in the control configuration.
- ▶ Check the power supply of the module.
- ▶ Replace the module if necessary.

- **Ext. diagnosis = Powerfail 0-7**
  The power supply for outputs 0 through 7 of the BT-4/DIO1 is not available or too low (<14 V). The outputs cannot be used.
- ▶ Check the power supply of the outputs.

NOTE

The message can be disabled with the DiagPF0_7Enable parameter.

- **Ext. diagnosis = Powerfail 8-15**
  The power supply for outputs 0 through 7 of the BT-4/DIO1 is not available or too low (<14 V). The outputs cannot be used.
- ▶ Check the power supply of the outputs.

NOTE

The message can be disabled with the DiagPF8_15Enable parameter.

- **Ext. diagnosis = no FPGAfile**
  No "c2_xpxx.bin" file was found on the flash disk of the C200. xpxx is the FPGA firmware version. The C200 controller cannot be used. The pinout of the C200 controller must match the pinout of the FPGA firmware. The pinout of the FPGA firmware is the number represented by p in the xpxx of the FPGA firmware version. The pinout of the controller can be read in the ControllerType1 parameter and is indicated by the p in FPGA=pyxxx.
- ▶ Install a valid "c2_xpxx.bin" FPGA firmware file with a matching pinout on the flash disk of the C200.

NOTE

While installing a firmware version on the C200 controller, the firmware assistant automatically copies the "c2_xpxx.bin" to the flash disk of the C200.

- **Ext. diagnosis = FPGA Pinout**
  No "c2_xpxx.bin" file with matching pinout was found on the flash disk of the C200. xpxx is the FPGA firmware version. The C200 controller cannot be used. The pinout of the C200 controller must match the pinout of the FPGA firmware. The pinout of the FPGA firmware is the number represented by p in the xpxx of the FPGA firmware version. The pinout of the controller can be read in the ControllerType1 parameter and is indicated by the p in FPGA=pyxxxx.
- ▶ Install a valid "c2_xpxx.bin" FPGA firmware file with a matching pinout on the flash disk of the C200.

NOTE

While installing a firmware version on the C200 controller, the firmware assistant automatically copies the "c2_xpxx.bin" to the flash disk of the C200.

- **Ext. diagnosis = FPGA not supp.**
  The current firmware on the controller (**C400**, **C600** or **P600**) does not match the hardware of the controller.
- ▶ Install a matching firmware version on the controller with the **Firmware Assistant** .
  Example:
  Firmware versions below 00.16.40 (e.g. 00.16.32) do not support HW versions with the FPGA pinout "3" (e.g. FPGA version = 0316).
  The currently used controller hardware does not yet support **BT-4/ENC1** bus terminals.

- **Ext. diagnosis = FPGA Version**
  An FPGA version was found on the controller (C200, C400, C600 or P600) that is specified as a beta test version.

The pinout of the FPGA firmware is the number represented by p in the zpxx of the FPGA firmware version. The pinout of the controller can be read in the ControllerType1 parameter and is indicated by the p (for C200, under FPGA=pyzpxx). The highest bit indicated by z is a beta test version.

- ▶ Install the released FPGA firmware file on the controller (C200, C400 and C600 -> flash disk; P600 -> hard disk).

- **Ext. diagnosis = BusAddr > Max**
  The PROFIBUS address is larger than the maximum permitted bus address.
- ▶ Check the PROFIBUS configuration.

788 Wiring error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 5

There is a wiring error.

- **Ext. diagnosis = Overload**
  The affected output is short circuited or overloaded.
- ▶ Check the wiring of the output.

- **Ext. diagnosis = Openload**
  The output is not connected or only slightly loaded.
- ▶ Check the wiring of the output.
- ▶ It may be useful to disable the diagnosis message.

- **Ext. diagnosis = PowerFail**
  The external power supply of the digital outputs was not connected. The supply of the digital outputs is checked, if at least one bit is set to 1 in the DiagMask parameter of the output group object.
- ▶ Check the power supply of the digital outputs.
- ▶ Check the DiagMask parameter.

- **Ext. Diagnosis = PowerFail** (**BT-4/ENC1**)
  The power supply of the encoder is too low.
  Parameter EncPowerSupply = "Intern / FALSE":
  Short circuit of the power supply (pin 5 and 9) to the connected encoder or defective bus terminal **BT-4/ENC1**.
  Parameter **EncPowerSupply** = "Extern / TRUE":
  The is no or not enough power at the X5 plug connector or there is a short circuit of the power supply (pin 5 and 9) of the connected encoder.
- ▶ Check the power supply of the encoder.
- ▶ Check the encoder cable.

- **Ext. Diagnosis = PowerFail** (**BT-4/ENC1**)
  A SinCos encoder (physical encoder) was entered in the PLC configuration, but no SinCos encoder is recognized at connector X2 or X3 of **BT-4/ENC1**.
- ▶ Plug the SinCos encoder cable into the **BT-4/ENC1** X2 or X3 connections.
- ▶ Check the encoder cable.

- **Ext. diagnosis = type not supp.**
  The connected encoder type is not supported by the system.
- ▶ Connect an encoder supported by the system.

- **Ext. diagnosis = out <-> out**
  Power is supplied externally to the connectors X2, X3, or X4 (pin 5 and 9) of the bus terminal **BT-4/ENC1**. The connector for the incremental encoder output may have been plugged into an encoder input.
- ▶ Check the assignment of the encoder connectors.

789 Single bus error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 6

A single bus error has occurred.

- **Ext. diagnosis = M=xx n.res**
  The module with bus address xx is suddenly not responding.
  The transfer is disrupted.
- ▶ Check the wiring of the module.

- PacNet Warning. An RX clock is missing.
- ▶ Check the wiring of the module.

8.5.9 8xx "System" diagnosis messages

800 Insufficient memory

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

The 800 diagnosis message is triggered as soon as the free main memory exceeds 512000 bytes. The DiagExtCode parameter in the control configuration or message logger can be used to localize the problem.

- Insufficient RAM for the project (DiagExtCode=free<512000).
- ▶ Reduce the control configuration, decrease RamDiskSize reduce the number of tasks, use a controller with more memory.

General Information on ScanDisk

A function for checking the file system on the IDE disk has been integrated in the firmware. This ScanDisk function is automatically called when the system boots. Errors are automatically detected, logged and corrected. The consistency of the file system is repaired. Defective, incomplete file are removed. A detailed protocol is saved in the message logger. After ScanDisk repairs the file system, a message 015 "Filesystem <ide0:> repaired" (see 8.5.1.15 015 filesystem <ide0:> repaired)) will be triggered. ScanDisk generates the following diagnosis messages:

DiagCode	DiagMsg	DiagExtCode
800	Insufficient memory	
801	Error reading FAT	
802	Error writing FAT	FAT <nr>
803	Inconsistency of FAT's	
804	Corrupt cluster detected	<dirname>
805	Corrupt filename detected	<dateiname>
806	Corrupt file size detected	<dateiname>
807	Multiple used cluster/block detected	<dirname>

DiagCode	DiagMsg	DiagExtCode
808	Corrupt directory name detected	<dirname>
809	Circular linked clusters/blocks detected	<dirname>
810	Error reading directory entry	<dirname>
811	Error writing directory entry	<dirname>
812	Lost cluster/block found	<number cluster>
813	Device <ide0:> not found	<devicename>
814	Initialization of <ide0:> failed	<devicename>
815	Error using function with <ide0:>	<devicename>
816	Bootrom.sys	
817	No devicename	
818	File not found	
819	File open error	
820	File read error	
821	File not continous	
822	Cluster read error	
823	Contents of file different	
824	No file name	
825	Invalid directory size	

801 Error reading FAT

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

802 Error writing FAT

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

803 Inconsistency of FAT's

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

804 Corrupt cluster detected

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

805 Corrupt file name detected

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

806 Corrupt file size detected

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

807 Multiple used cluster/block detected

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

808 Corrupt directory name detected

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

809 Circular linked clusters/blocks detected

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

810 Error reading directory entry

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

811 Error writing directory entry

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

812 Lost cluster/block found

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

813 Device <ide0:> not found

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

814 Initialization of <ide0:> failed

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

815 error using function with <ide0:>

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

816 Bootrom.sys

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

817 No devicename

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

818 File not found

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

819 File open error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

820 File read error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

821 File not continuous

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

822 Cluster read error

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

823 Contents of file different

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

824 No filename

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

825 Invalid directory size

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 2

826 Error During PIC FW Update

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 1

An error occurred during a firmware exchange for the PIC controller (on C400, C600, or P600). The PacDrive controller is in bootloader mode and is attempting to exchange the firmware again. The firmware (such as file "c6p_0511.bin") is on the flash disk (C400 and C600) or on the hard disk (P600). When the firmware has been exchanged, the controller will be reset (Reset).
PacDrive controller P600 has no automatic reset. A note appears on the display. After the real-time system successfully starts up, the firmware file is deleted automatically.

- **Ext. diagnosis = bootl.active**
  This message appears after an unsuccessful PIC firmware update.
  ▶ The PacDrive controller attempts to exchange the firmware again.
  ▶ If this attempt also fails, contact your ELAU customer service representative.

- **Ext. diagnosis = File not found**
  This message appears with message "bootl. active." This means it appears when an update is forced in the PIC bootloader but the necessary file is not on the flash disk (C400 and C600) or on the hard disk (P600).
  ▶ Transfer the firmware file to the flash disk (C400 and C600) or to the hard disk (P600).
  ▶ If this attempt also fails, contact your ELAU customer service representative.

- **Ext. diagnosis = File not OK**
  This message appears when the PIC update file is incorrect.
  ▶ Transfer the correct firmware file to the flash disk (C400 and C600) or to the hard disk (P600).
  ▶ If this attempt also fails, contact your ELAU customer service representative.

- **Ext. diagnosis = Header not OK**
  This message appears when the ELAU header in the file is not correct.
  ▶ Transfer the correct firmware file to the flash disk (C400 and C600) or to the hard disk (P600).
  ▶ If this attempt also fails, contact your ELAU customer service representative.

- **Ex. Diagnosis = HWIndex <> <Index>** (e.g. HWIndex <> 5)
  Checking hardware dependencies. The message appears if PIC update files are found that have an incorrect hardware code. The index outputs the required HW index.
  ▶ Use the PIC update file that matches the device (hardware).

827 Power-Off due to hardware monitoring

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 3
MsgFilter: Bit 1 "Diagnosis Messages"

The hardware provides an internal error logger that logs all the causes for error-dependent controller deactivations. The next time the controller is started up the error logger is analyzed and the cause of the error can be output in the message logger. In addition, a more specific message is displayed (055 "Debug message cause by hardware monitor" (see 8.5.1.54 055 Hardware Monitoring Debug Message)) that can be enabled by the MsgFilter Parameter through the EPAS-4 message logger. This message is intended to be a debug message and outputs the exact cause of the deactivation.

- The DiagExtCode defines the error further (high or low voltage, high or low temperature, fan error, temperature sensor error):
  - Voltage<Min
  - Voltage>Max
  - Temp<Min
  - Temp>Max
  - Fan error
  - LM75 error
- ► Contact your ELAU representative.

8.5.10 9xx "Software" diagnosis messages

900 Software error (suspend Task)

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

This error should not occur while the PacDrive system is running.

- -
- ► Contact your ELAU representative.

901 Software error (invalid opcode)

Diagnosis class (see 8.1 Diagnosis Classes) (standard): 4

This error should not occur while the PacDrive system is running.

- -
- ► Contact your ELAU representative.

902 Software error (page fault)

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 4

This error should not occur during operation of the PacDrive system.

- An firmware version older than < V00.10.00 was played onto a PacDrive controller and the project on the flash disk of the PacDrive controller was created for firmware >= 00.10.00.
  The error occurs while booting and is entered under object MAX4 in the message logger.
- ► Retransmit project from EPAS-4.

- It is entered under object IECPRG in the message logger. A serious error has been detected in the IEC task named under instance in the message logger.

Possible errors include e.g. not observing the array limits, erroneous handling of pointers or the address operator (ADR).

► Record erroneous program spot and correct user program.

903 Software error (class 2)

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 2

This error should not occur during operation of the PacDrive system.

▪ -

► Get in touch with your ELAU contact person.

904 Software error (class 1)

Diagnostic class (see 8.1 Diagnosis Classes) (standard): 1

This error should not occur during operation of the PacDrive system.

▪ -

► Get in touch with your ELAU contact person.

9 Uninterruptible Power Supply UPS

The PacDrive controllers C400, C600 and P600 can be fitted with an internal battery pack for an uninterruptible power supply. This is continually being charged via the power supply of the controller while in operation. The function of the battery pack is to maintain the power supply to the controller in the event of a power failure long enough to shut down the controller properly and not lose any data. The pre-set time of shut-down can be up to 5 minutes.

If necessary, the battery pack can also be installed or replaced after the fact for the UPS, see Retroactive installation of UPS (see 9.1 Retroactive installation of UPS).

9.1 Retroactive installation of UPS

PacDrive C400, C600, P600

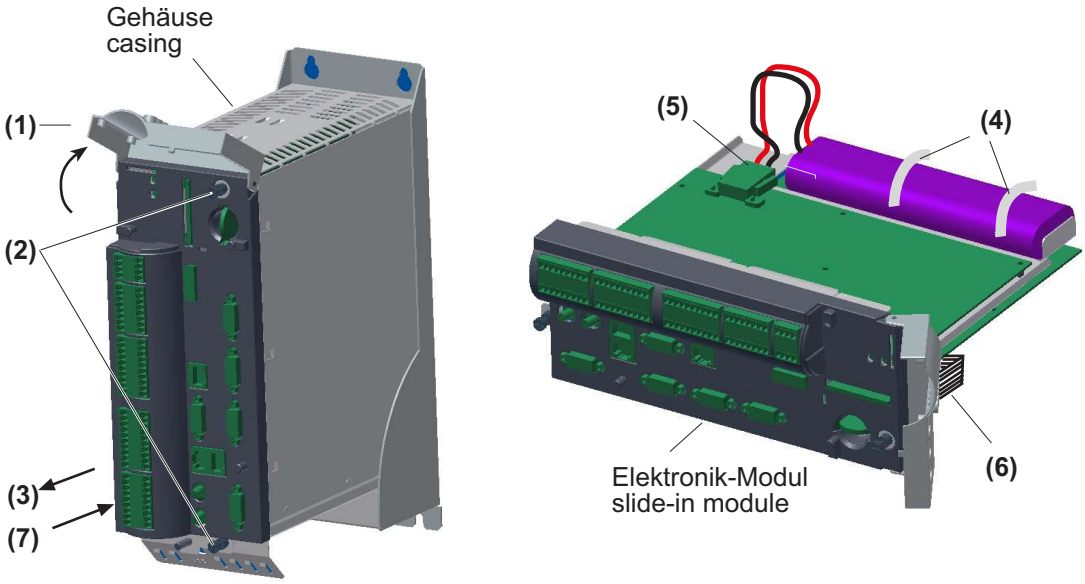


Figure 9-1: PacDrive controller UPS installation

- ▶ Open operating cover (1).
- ▶ Remove electronic module fastening screws (2).
- ▶ Remove electronic module (3) from housing.

⚠ CAUTION

Battery pack not properly secured!

Mechanical damage of PacDrive controller possible!

- ▪ Use only the supplied cable ties to secure the battery pack (Item no. 53130050).
- ▪ Check that the battery pack is properly secured.

- ▶ Adjust the battery pack and attach with 2 cable ties (4).

- ▶ Connect battery cable (5).

⚠ CAUTION

Do not force the electronic module into the housing!
Damage to display supply cable possible!
- Take care that during installation of the electronic module the display supply cable (6) does not get caught or torn.

- ▶ Carefully push the electronic module back into the housing (7).
- ▶ Screw the electronic module to the housing with the fastening screws (2).
- ▶ Close operating cover.
- ▶ See chapter on how to charge battery.

NOTE

The maintenance interval for replacing the battery is 3 years. Once this period has gone by the battery pack must be replaced.

10 Appendix

10.1 Addresses

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Internet: www.elau.it

NOTE

Additional contact addresses can be found on the ELAU homepage (www.elau.de).

10.2 Additional Literature

You can obtain the following manuals and instructions about the PacDrive™ system from ELAU:

Programming manual
Item no. 17 13 00 61 - 00x (DE, EN)

PacDrive MC-4 Operating Manual
Item no. 17 13 00 62 - 00x (DE, EN, IT, FR)

CAN L2 Operating Manual
Item no. 17 13 00 66 - 00x (DE, EN)

PROFIBUS-DP Operating Manual
Item no. 17 13 00 67 - 00x (DE, EN)

SM Motor Operating Manual
Item no. 17 13 00 68 - 00x (DE, EN, IT, FR)

EPAS-4 Operating Manual
Item no. 17 13 00 70 - 00x (DE, EN)

PacDrive Controller MAx-4 Operating Manual
Item no. 17 13 00 71 - 00x (DE, EN, IT, FR)

OPC Server User Manual
Item no. 17 13 00 73 - 00x (DE, EN)

Device Net Operating Manual
Item no. 17 13 00 76 - 00x (DE, EN)

HMI Libraries Operating Manual
Item no. 17 13 00 77 - 00x (DE, EN)

INC-4 Incremental Encoder Module Operating Manual
Item no. 17 13 00 78 - 00x (DE, EN)

CANopen Operating Manual
Item no. 17 13 00 79 - 00x (DE, EN)

Motion Toolkit ECAM-4 Operating Manual
Item no. 17 13 00 80 - 00x (DE, EN)

PacNet Module PN-4 Operating Manual
Item no. 17 13 00 81 - 00x (DE, EN)

SR Motor Operating Manual
Item no. 17 13 00 82 - 00x (DE, EN)

BT-4 Bus Terminals Operating Manual
Item no. 17 13 00 83 - 00x (DE, EN)

TTS Training and Test Systems Operating Manual
Item no. 17 13 00 88 - 00x (DE)

Automatic Controller Optimization User Manual
Item no. 17 13 00 89 - 00x (DE, EN)

PacDrive SCL Operating Manual
Item no. 17 13 00 93 - 00x (DE, EN)

PacDrive PS-4 and PacDrive PD-8 Operating Manual
Item no. 17 13 00 94 - 00x (DE, EN)

Evaluation Kit User Manual
Item no. 17 13 00 95 - 00x (DE)

PacDrive Controller P600 Operating Manual
Item no. 17 13 00 96 - 00x (DE, EN, IT, FR)

PacDrive Controller C200 Operating Manual
Item no. 17 13 00 97 - 00x (DE, EN, IT, FR)

PacDrive Controller C400 Operating Manual
Item no. 17 13 00 98 - 00x (DE, EN, IT, FR)

PacDrive Controller C600 Operating Manual
Item no. 17 13 00 99 - 00x (DE, EN, IT, FR)

PacDrive PC Panel PCP Operating Manual
Item no. 17 13 01 02 - 00x (DE)

SH Motor Operating Manual
Item no. 17 13 01 05 - 00x (DE, EN)

Intelligent Servo Module iSH Operating Manual
Item no. 17 13 01 13 - 00x (DE, EN)

Power Supply PS-5 and Distribution Box DB-5 Operating Manual
Item no. 17 13 01 15 - 00x (DE, EN)

Item no. …-000 DEutsch …-001 ENglish …-002 ITalian …-003 FRench

10.3 Product Training Courses

We also offer a number of training courses about our products.

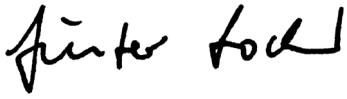
Our seminar leaders with several years of experience will help you take advantage of the extensive possibilities offered by the PacDrive™ system.

NOTE

Go to the ELAU homepage for more information and our current seminar schedule (www.elau.de).

10.4 Manufacturer's declaration

ELAU	**Herstellererklärung / Declaration by the manufacturer / Déclaration du constructeur**	**ELN 117-02/02.04** Page 1/1

Product : **PacDrive Controller** **MAx-4** **C200** **C400** **C600** **P600** The manufacturer guarantees that the product delivered was manufactured in accordance with the applied harmonized standards / specifications. **Applied harmonized standards:** **EN 60204-1 (11/1998)** Safety of machines - electrical equipment **EN 50081-2 (3/1994)** Electromagnetic compatibility. Generic emission standard **EN 61000-6-2 (3/2000)** Generic standards - Immunity for industrial environments **Manufacturer:** ELAU AG Dillberg 12 97828 Marktheidenfeld, Germany **Stellung im Betrieb / Position:** Vorstand/Chairman/Directeur  1/9/04 Günter Locherer ..... (Datum, Date / Unterschrift, Signature)	product: **PacDrive Controller** **MAx-4** **C200** **C400** **C600** **P600** The manufacturer guarantees that the product delivered has been manufactured in accordance with the applied harmonized standards / specifications. **Applied harmonized standards:** **EN 60204-1 (11/1998)** Safety of machines - electrical equipment **EN 50081-2 (3/1994)** generic standard for noisy emission **EN 61000-6-2 (3/2000)** generic standard interference-resistant **Manufacturer:** ELAU AG Dillberg 12 97828 Marktheidenfeld, Germany	Product : **PacDrive Controller** **MAx-4** **C200** **C400** **C600** **P600** Le constructeur déclare que le produit livré a été fabriqué en conformité avec les normes et spécifications harmonisées mentionnées ci-dessous. **Normes harmonisées utilisées:** **EN 60204-1 (11/1998)** Sécurité des machines - Equipement électrique **EN 50081-2 (3/1994)** Norme générique sur l'émission de perturbations **EN 61000-6-2 (3/2000)** Norme générique sur l'immunité aux perturbations **Constructeur:** ELAU AG Dillberg 12 97828 Marktheidenfeld, Germany

10.5 Safety tests

The following safety checks for the PacDrive controller are performed in production in accordance with EN 50178 / EN 60204-1:

Check for end-to-end connection of grounding conductor

with 30 A

Insulating resistance check

with U = 500 V DC

Withstand voltage check

with U = 2500 V DC
for a time period of 1 min.

10.6 Hardware/software compatibility list

Software package version	Hardware code
V16.A.x.x	1743100320 or higher
V22.A.0.x	1743100320 or higher

Table 10-1: PacDrive Controller P600 hardware and software compatibility

10.7 Changes

06/2004

- New edition of the operating manual

02/2007

- Various error eliminations and additions
- Layout of document revised
- Diagnostic messages expanded
- PROFIBUS connector added
- Chapter on uninterruptible power supply added
- Chapter on hardware/software compatibility list added

NOTE

The updated documentation, application notes and the updating to the products are available on the ELAU Homepage.

11 Fault report form

This error report is required without fail to enable efficient processing.

Send the error report to the responsible ELAU representative or to:

ELAU AG
Customer Service Department
Dillberg 12
97828 Marktheidenfeld, Germany
Fax: +49 (0) 93 91 / 606 - 340

Return address:

Company:	**City:**	**Date:**
Department:	Name:	Tel.:

Specifications regarding product in question

Item name: .....

Item no.: .....

Serial number: .....

Software version: .....

Hardware code: .....

Parameters included Yes [ ] No [ ]

IEC - Program included: Yes [ ] No [ ]

Information about machine on which the error occurred:

Machine manufacturer: .....

Type: .....

Operating hours: .....

Machine no.: .....

Date of commissioning: .....

Manufacturer / Type of machine control:

.....

How did the error present:

.....

.....

.....

Additional information:

Condition of error:
[ ] is always available
[ ] during commissioning
[ ] occurs sporadically
[ ] occurs after approx. hours
[ ] occurs when shaken
[ ] depends on temperature
[ ] contaminant in device

Causes:
[ ] unknown
[ ] wiring error
[ ] mechan. damage
[ ] moisture in device
[ ] encoder defective

Accompanying side effects:
[ ] problems in the mechanism
[ ] power failure (24V)
[ ] controller failure
[ ] motor failure
[ ] broken cable
[ ] insufficient ventilation

Is there an air conditioner in the switch cabinet? Y / N [ ]

Have there been similar errors in the same axis previously?
How often: .....

Did the errors always occur on certain days or at certain times of day?

.....

other information:
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